The Engineering and Mining Journal

WITH WHICH IS CONSOLIDATED "MINING AND METALLURGY."

VOL. LXXV. NEW YORK, SATURDAY, MAY 23, 1903. No. 21.

THE ENGINEERING AND MINING JOURNAL
AND MINING AND METALLURGY ESTABLISHED 1866

PUBLISHED EVERY SATURDAY.

261 BROADWAY, NEW YORK.

TELEPHONE 6866 CORTLANDT. P. O. BOX, 1833

CABLE ADDRESS "ENGMINJOUR" NEW YORK.

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ONE OF THE SYMPTOMS of the activity of the mining industry, and of the greater interest taken in its development, is the number of patents taken out for mining and metallurgical devices and processes. During the past year, the number of patents of this kind has been steadily increasing, and as our readers will note from the page devoted to them, we have never before reported so many as since the opening of the present year. While it is true that many of these patents are of comparatively little value, the large number issued every week is certainly an indication of the increasing amount of work done for the improvement of technical practice.

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THE BOYCOTT is a weapon which in Germany seems to be used by manufacturers as well as striking workmen. The latest case of its application is by the German Wire Nail Syndicate. Certain works in Saxony refused to join the Syndicate and were accused of the crime of underselling the prices fixed by the Kartel. The Syndicate has, therefore, announced that it will boycott these works, and will strive in every way to injure their business, and take away their customers. For this purpose it is ready to go even to the extreme length of a general reduction of prices. No secret is made of the intentions of the Syndicate, and the alternative of acceding to the Kartel or seeing their business destroyed is presented to the Saxon manufacturers. So far, however, they seem determined to hold out.

⚒

THE DISCUSSION as to the respective advantages of electricity and compressed air for the transmission of power in mines is going on in England as well as here. At the recent meeting of the Midland Institute and also at the meeting of the North of England Institute of Mining Engineers the use of electricity was under discussion. A committee appointed by the Home Office is also taking evidence as to the dangers which may arise from the use of electricity in coal mines. Some interesting experiments on this point are reported, a summary of which we hope to give shortly in our columns. In the North of England Institute the opinion of quite a number of the engineers as to the dangers of electricity seems to be quite decided. Prof. Henry Louis, the well-known engineer, is taking an active part in the discussion.

⚒

A RECENT ATTEMPT of certain of the Scotch steel manufacturers to organize a trust and maintain the price of boiler-plates, has come to decided grief. For a time it was apparently successful, although one large independent house refused to come into the combination. This concern, however, was a manufacturer principally of ship-plates, and did not concern itself very much with the operations of the trust until the latter attempted to coerce it into raising the price of ship-plates. The independent concern, resenting the attempt of the combination to undersell it on the last-named class of material, turned a portion of its works to the manufacture of boiler-plates and proceeded to cut prices very vigorously. The result has been that the price of plates which had been maintained for some time at £7 10s. per ton, has been reduced to £6 5s., and the trust has informally decided to disband.

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THE TABLES published in another column show that the actual deliveries of Lake Superior ores to furnaces for the season year ending May 1 last, reached the enormous total of 21,905,251 tons, which is an increase of nearly 4,700,000 tons over the previous year. At the average tenor of lake ores, this quantity represents about 13,200,000 tons of pig iron. This confirms the statement in our issue of January 3, that during the past year fully 75 per cent of all the pig iron made in this country was from lake ores. The heavy deliveries during the past winter reduced the stocks on docks at the Lake ports much below the anticipated quantity. On December 1, the stocks reported amounted in round figures to 7,074,000 tons, and on May 1, they had been reduced to 3,592,000 tons. This statement does not include any of the ore which came down in April. These shipments were comparatively small, owing to the trouble in the vessel trade, but ore is now coming in very freely.

⚒

THE PROVERBIAL saying that salt is the savor of life seems to be mockery to the unfortunate promoters who have tried to monopolize the industry in this country. Following on the heels of the ill-fated Federal Salt Company that controlled the trade on the Pacific Coast, the National Salt Company, known as the Eastern combination, is advertising its plants for sale. In the first case, arbitrary prices and a complete monopoly precipitated the condemnation of public opinion and the law; in the second, extravagant mismanagement caused bankruptcy. The National Salt Company was formed in 1899, with a capitalization of $12,000,000, and stockholders have

received only $1,490,000 in dividends. Two years after organization an attempt was made to rehabilitate the company by exchanging its securities for those of the International Salt Company, which was then formed with $30,000,000 capital. Subsequently, however, receivers were appointed for the National Salt Company, who now deem it expedient to dispose of the property and thus close an unsuccessful career.

⚒

A PEACEFUL END.

Recent Johannesburg papers record the proceedings of the general meeting of the shareholders of the Johannesburg Pioneer Gold Mining Company, held on April 6, when this company was formally wound up, after having accomplished the object for which it was organized. It is rarely that the plans of a mining company are carried out to such complete fulfilment. As our readers are aware, no "apex rights" are given under the mining laws of the Transvaal, mining explorations on the part of the owners of a block of ground being severely limited to the territory vertically under the boundary lines of their property. When the vein or "reef' has been stoped on the dip up to the side-line, and along the strike up to the end-lines, and cross-cuts have failed to find another vein, there is nothing to do but to square accounts and wind up the concern. The Pioneer was one of the first of the outcrop companies to be formed; the area of ground, as was the case with most of the early floatations, happened to be very small, but, unlike most of its neighbors, the Pioneer Company did not increase its area by absorption or by amalgamation with other properties. Consequently, it was left to itself and after a comparatively short but creditable existence, it has ceased to be.

The plant and mill-tailings were sold for $55,000, the directors were voted a bonus of $15,000 for their past services, and a final dividend of $2 per share was distributed among the shareholders.

In his speech the chairman briefly outlined the interesting history of the company. It was registered on the 26th day of October, 1897, with a capital of $75,000, of which $28,500 was working capital. The capital was subsequently increased to $105,000, the shares being taken up at par; therefore, the total working capital raised from shareholders was $58,500. The property consisted of certain claims on the Main Reef—a little over seven—of which 5 2-3 contained reef, the balance being to the north of the reef.

The total tonnage won from the claims was 241,215, which yielded gold which sold for $4,589,435, equal to $18.46 per ton. The cost of winning this gold was $2,350,275. Therefore, the cost of winning the gold and all the other general expenses of the company were $9.47 per ton. The profits obtained amounted to $9.04 per ton, or, put in another way, every sovereign cost to produce $2.49, or 51.21 per cent of the yield.

Averaging the mine, every claim yielded 42,567 tons for the mill, and every ton yielded in dividends to the shareholders $9.04. The total percentage paid out, and to be paid out, in dividends amounts to 2,172.50 per cent, and in addition the shareholders received a bonus of two South Rand shares for every share in the company. These shares, taken at $36.45, equals another 1,500 per cent dividend, bringing the total dividends up to 3,672.50 per cent for every $5 share in the company.

As viewed from the standpoint of a limited stoping area and a proximate finality to its operations, a property on the Rand resembles a coal mine, differing only in yielding a product which is not as subject to the vicissitudes of markets, and the ravages of competition. It is mining on an investment basis, without the risk of the heavy losses and without the chances of the great rewards which constitute the surprises of ordinary metal mining in other regions.

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GOOD ROADS.

In this issue we publish the concluding portion of an interesting and useful article on "Roads for Mines" by Mr. James W. Abbott. We believe that this contribution, by a practical man and addressed to practical men, will prove serviceable to those engaged in the development of new regions. The recent highly successful convention of the Good Roads movement at St. Louis renders it opportune to refer to this subject.

The active propaganda in behalf of good roads is a movement which vitally affects the development of our mining regions and for this reason, even without the stimulus of a broad public spirit, we are keenly interested in the activity displayed by the Department of Agriculture under the guidance of Mr. Martin Dodge, director, and his three special agents, Messrs. J. A. Holmes, R. W. Richardson and J. W. Abbott. Mr. Holmes, now chief of the Department of Mines and Metallurgy for the St. Louis Exposition, has for many years been the foremost apostle of good roads in the South. Mr. Richardson, as secretary of the National Good Roads Association, has been responsible for much of the important work accomplished by that organization. Mr. Abbott has charge of the Rocky Mountain and Pacific Coast Division, and we are familiar with the ability and energy he has shown in helping forward the movement for good roads throughout the mining regions.

Bureaucratic influences are often so misapplied that when they are actually beneficently directed one is apt to under-estimate the value of the work which they do. For this reason we desire to give our cordial support to a movement which we regard as of fundamental service to the mineral industry of the entire country, and especially to those rugged portions of the West, where the railroad cannot be extended save at great expense.

The amount of money appropriated for rivers and harbors is one of the astounding features of our system of government. More than $500,000,000 has thus been spent. Expenditure for this purpose was combatted for a long time, but was finally endorsed by Congress, and every session sees it renewed with flamboyant recklessness. Government extravagance in this direction now hampers the urgent demand that money be appropriated for the necessary improvement of roads, which, like rivers, are the arteries of commerce.

A branch of the Department of Agriculture began to collect data and disseminate information on this subject about ten years ago, and since then much has been done. Certain States have for years appropriated considerable amounts, which under the supervision of highway commissions have, in cooperation with the counties, been expended in making roads. At first there was opposition to this use of public moneys; now local interests are uniting in a clamor for more road building, because the stimulation of industry consequent upon road improvement has been felt to a marked degree. Congress has been importuned to make an appropriation of $20,000,000 to be shared by the States in proportion to their population, to be used with local contributions of equal amounts for building roads, and it is likely that the wave of popular demand will finally succeed in getting due recognition of the importance of the matter.

In the new regions of the West the rapid extension of railroads has obscured the relative importance of the wagon roads which are tributary to them. Experience in other mining countries accentuates the observation that bad roads are a tax on mining far more onerous than any dividend or property tax as yet devised, and that the economies of the industry ought to begin with the construction of good wagon roads, designed on engineering principles and planned so as to cover a region with the minimum mileage. We wish the Good Roads movement success.

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THE GEOLOGIST IN PRACTICAL MINING.

Some of our friends have been adding to the gaiety of the nations and to the enlightenment of our readers by their discussion of a subject which commands the interest of a wide circle, namely, the limitations of geology as applied to actual mining. Mr. Spurr, of the Geological Survey, opened the debate by a strong statement of the geologist's point of view, his argument being that without geology mining would be nearly impossible, while with it the essential hazard is much minimized; Mr. Argall, representing the mining engineering profession, denies that the professional geologist has advanced practical mining to any such extent as has been claimed, and asserts that the discovery of new districts has been made without his aid. Mr. Argall holds that the official geologist writes last year's almanac and publishes carefully prepared obituaries, the academic interest of which is much greater than their ability to be of timely service. Mr. Forbes Rickard takes a middle ground, and while pointing out that geology does not help in the exploitation of known ore-bodies, it does help in the further search for those which occur under structural conditions, which geologists have themselves deciphered. Mr. Purington writes thoughtfully and throws the weight of historic considerations against the assumptions of the geologist, who is not properly equipped to act as advisor to the men who come more into touch with the realities of underground work. Mr. Lindgren, another distinguished member of the Survey, demurs to Mr. Argall's estimate of the practical value of the geologist's services to mining and stoutly maintains that the reports of the latter have proved to be of the greatest practical utility. Finally, incited evidently by Mr. Lindgren's reference to the mine captains as a class lacking in that foundation in science which is so indispensable, Capt. Penberthy takes up the cudgels for the Cornishmen who mined before geology existed, and submits that the geologist himself needs a greater familiarity with conditions encountered underground. Thus are various aspects of the subject in turn presented.

But all has not been said even then. When the

parties at interest seem to have stated their case and not much more appears needed to furnish grounds for a fair decision, there comes a mild protest, from the back seats of the court-room, as it were, from a representative of the shareholders in mines, the patient folk who are the Mercutio to the Montagues and Capulets of geology and practical mining, and after muttering "a plague on both your houses," a shareholder chirrups courageously concerning his view of the matter.

It is not for us to pass judgment on the merits of the case, but as a friend of both parties we would suggest a line of thought which can best be expressed by simile. Astronomy is to navigation what geology is to mining. You cannot safely steer a ship across the trackless waste without a compass and a quadrant, supplemented by an astronomical almanac, nor is it wise to try to find a way amid the darkness of the world underground without the transit of the surveyor and the map of the geologist; nevertheless, a ship in charge of astronomers would afford a dangerous method of travel, for they would not know how to trim the sails or to ride the storm; similarly, a mine directed by geologists would soon become only a hole in the ground and operations would inevitably become risky by reason of a neglect of timbering, of the ventilation, and of other practical details that make for safety. While a sailor ignorant of the science of navigation is not fit to command an ocean-going vessel, he may yet be able to handle with safety the fishing smack that cruises within sight of shore; similarly, the plain miner, unacquainted with the science of geology is ill-fitted to manage a large mine, but he can do ample justice to the opening up of a prospect, the workings of which do not penetrate far below the surface. You need a seasoned sailor *and* a skilful navigator to make a safe voyage across the ocean, you require a miner *and* a geologist to develop a large mine successfully. If the sailor will learn more of navigation he will become a more useful man at sea, and if the miner will pick up some geology he will handle his mine all the better. The fact is, we need all the knowledge we can get; mining is one of the most difficult occupations followed by humanity, there is no room for a disregard of aid from any source. Let the geologist realize the smallness of the base on which his top-heavy theories stand, and let the miner recognize the narrowness of the experience of which he boasts. The worker should honor the thinker and the thinker in return may well try to outdo the man of action in humility when facing the problems which confront both of them in their honest endeavor to direct a great industry.

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MARKET CONDITIONS.

The metal markets generally have been rather quiet. While business has not been heavy for early deliveries, consumption continues large in all directions, and there are signs of greater activity in the near future.

Transactions in copper have not been heavy, but consumers are showing more interest in the market, and it is beyond question that they will be soon looking for supplies. At any rate, metal is not being pressed for sale, producers generally holding back in the expectation that higher prices will rule. Most producers are sold up to July at least, and, as we have recently shown, there are no considerable stocks available. In the meantime, the market is practically made by sales of moderate quantities which are needed for immediate consumption. It should be, of course, understood that the market is necessarily made, not by what producers ask for futures, but by the prices actually paid on such sales as make up the daily business.

Tin has been less active and somewhat weaker. The large spot stocks which have been pressed on the market are being gradually worked off, and buyers have shown some disposition to speculate a little for the future.

Lead continues quiet and unchanged, with the usual large consumption. The prices of this material are now so regulated that consumers have no special motive in buying ahead of their requirements, and there is nothing beyond the regular daily business.

Spelter continues strong with but little change in prices. Consumption is on a very good basis, and producers have no stocks ahead. Zinc ore continues high. Prices this week range from $35 to $37 per ton of 60 per cent ore. Some extra quality ore in the Joplin market sold at $40 per ton. Production is somewhat lighter than last year.

Silver continues to show a fairly high range of values under the influence of coinage purchases here and abroad. Demand for the East continues rather light. The discussion of the proposed changes in the monetary system of Mexico continues, and it is the general belief that the country will in time adopt the gold standard, but progress in that direction is necessarily slow.

The iron trade continues quiet, and buyers appear to be still holding off in the hope of securing concessions. New orders are not being placed with any degree of freedom. Pig iron sales have been only moderate, and there is a probability that lower prices on foundry iron will obtain, though any change in bessemer or basic is somewhat doubtful. In finished material the same conditions prevail. The strikes all over the country are having a discouraging effect upon the building trades, and purchasers of material for future use are hesitating until some settlement is reached.

The Western coal market is quiet, supplies being readily obtainable on all the large consuming centers. The Lake trade is active and coal is being rushed forward to all the lake ports.

The Atlantic seaboard bituminous trade continues quite dull, the amount of coal arriving at tidewater being sufficient for all needs. Prices show a little improvement. The outlook is that dullness will continue for some weeks.

The anthracite trade continues very brisk, with demand strong for all parts of the country. Shipments from the mines are heavy, but the demand is greater than the shipments. The prospects are that trade will be active all summer.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Protective tariffs may be some help in commercial production; but they can serve only in a limited degree. The main point in the modern iron and steel trade is economy in production—economy in the production of motive power; economy in fuel for heating; economy in the application of labor-saving appliances, and in the saving of waste of all kinds. There is still a great field open in this direction.

The English workmen who visited this country with Mr. Moseley don't seem to approve of our industrial conditions. Possibly a visit of American workmen to England might result in a report of a very similar nature. Prejudice does not constitute the best medium for eye-glasses.

As to cheapness of labor, it is borne out by experience that in a country where rates of wages are highest, labor cost per ton of product is lowest, and vice versa. This is well illustrated in the American practice. The reverse can be seen in Russia, where labor is very cheap, and labor-saving appliances are comparatively few, with the result that labor costs per ton of product are very high.

Dr. James Douglas says, in a recent paper, that the average copper ore mined does not contain over 3 per cent of metal; therefore, to produce the copper won in this country yearly, some 9,000,000 tons of ore must be mined; that is, nearly one-third of the weight of the iron ore which we produce. Every ton of copper produced requires approximately the consumption of 4 tons of fuel, and about 20 ft. of lumber are used underground for very ton of ore taken out.

We recently mentioned the purchase of 9,000 tons of nickel-steel rails by the Pennsylvania and the Baltimore & Ohio railroads for use on sharp curves, where the wear is extra heavy. On the Baltimore & Ohio some nickel steel was laid near Cumberland in 1897, and the rails are still in service, apparently good for some years more. Mild steel rails laid at the same point in 1898 had to be renewed last year, as they were worn down to the limit of safety.

At the ore docks at Conneaut, Ohio, on May 7th last, 5,300 tons of ore were unloaded in 5 hours and 40 minutes from the steamer *James H. Hoyt*. The unloading was clean, no labor being required; moreover, 57 minutes were spent in waiting for cars, so that the actual operating time was 4 hours and 43 minutes. Hulett machines were used, and they handled about 1,200 tons of ore an hour. This seems to be very near the limit of speed possible.

The total gold production of the world from the discovery of America by Columbus to the year 1900 is, according to the report of the United States Mint, in round numbers, $9,811,000,000. Pure gold of this value would weigh about 16,272 tons, and occupy a space equal to 27,039 cubic feet. Graphically this amount could be represented by a solid circular tower of gold 20 ft. in diameter, and 86 ft. high. The total yearly world production of gold since 1900 would increase the height of such tower about 3 ft. each year.

At the winding up of the Pioneer Gold Mining Company, at Johannesburg, the chairman, Mr. R. R. Hollins, gave the exact yield of one particular claim as computed after its exhaustion. We may add that a claim in the Transvaal covers an area of 154.95 by 413.2 English feet.

Mr. Hollins said: "In 1897 I got Mr. Surveyor Tucker to block out the exhausted claim, and he certified the measurement to be 64,375 tons; waste rock sorted out of same was 16.67 per cent, equal to 10,731 tons, leaving quartz actually sent to mill, 53,644 tons. From this quartz we actually recovered in gold 54,985.10 oz., which we actually sold for $969,660, which represents the gold actually recovered and sold from one claim. To this will be added what has yet to be recovered from the slimes from this tonnage. On recovered gold we actually paid out in expenses for mining, milling, re-treatment and development $387,030, thus leaving an actual net profit, which has been handed to shareholders, of $582,630. I think, gentlemen, I will allow these figures to speak for themselves, without the addition of any comment from me; but I hope for the sake of shareholders that there will be many other companies upon this Rand which will have a similarly prosperous career."

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

WATER IN VEINS.

The Editor:

Sir.—I have at hand your letter, in which you ask for particulars about water in the mines of Kalgoorlie. We have sent out circulars to the various mines and have tabulated the results, of which we enclose copy.

WATER IN VEINS. WEST AUSTRALIA.

Name of Mine.	Depth at which water was encountered.	Depth at which the maximum flow was encountered and amount in gallons per minute.	The present depth of the bottom of the workings and the amount of water coming in there.
Kalgoorlie.			
1. Oroya Brownhill Co., Ltd.			
a Brownhill Lease	240 ft.	570 ft. 10 gals. per min.	600 ft. True Blue workings 850 ft. 600 gals. per 24 hrs.
b Oroya North Block	190 ft.	250 ft. 0.36 gals. per min.	826 ft. nil. All water coming in from 650 ft. level.
c Oroya South Block	407 ft.	670 ft. 1.80 gals. per min.	670 ft. 2000 gals. per 24 hrs.
2. Lake View Consols, Ltd.	250 ft.	1250 ft. 1 gal. per min.	1350 ft. No water making in shaft, 1½ gals. per min. being pumped.
3. Ivanhoe G. Corporation, Ltd.	200 ft.	600 ft. 3½ gals. per min.	915 ft. No water worth mention.
4. Great Boulder Main Reef, Ltd.	75 ft.	600 ft. South Drive, 14 gals. per min.	1100 ft. No water coming in at bottom of shaft; soakage from upper levels 4 gals. per day.
Kookynie.			
Cosmopolitan Proprietary, Ltd.	150 ft.	400 ft. 350 gals. per min.	450 ft. 200 gals. per min.
Leonora.			
Sons of Gwalia, Ltd.	100 ft.	300 ft. 120 gals. per min.	968 ft. No water making at bottom of shaft. All water comes from above 300 ft. level and is pumped from cistern at No. 7 level.
Lawlers.			
1. East Murchison United, Ltd.	75 ft.	120 ft. 100 gals. per min.	375 ft. Very little water making in bottom. Total water now making 130 gals. per min.
2. Waroonga So. G. M. Co., Ltd	80 ft.	276 ft. 66 gals. per min.	276 ft. 66 gals. per min.
3. Vivien G. M. Co., Ltd.	97 ft.	112 ft. 11 gals. per min.	112 ft. 11 gals. per min.
Lake Darlot.			
Fingall Reefs Extended, Ltd.	24 ft.	160 ft. 85 gals. per min.	250 ft. 50 gals. per min.
Mount Sir Samuel.			
Bellevue Proprietary, Ltd.	50 ft.	90 ft. 10-12 gals. per min.	275 ft. No water making.
Day Dawn.			
1. Great Fingall Consol., Ltd.			
a Day Dawn Shaft	100 ft.	175 ft. 50 gals. per min.	745 ft. No water making.
b Armstrong Shaft	not known	not known. 24 gals. per min., most of which comes from 340 ft. level.	
2. West Fingall, Ltd.	100 ft.	180 ft. 100 gals. per min.	275 ft. No water. Workings give 21 gals per min.
Wiluna.			
Golden Age Consol., Ltd.	70 ft.	142 ft. 100 gals. per min.	238 ft. 2 gals. per min.

From the shallow depth at which most of these mines are worked it seems difficult to draw any reliable conclusions as to the probable flow of water at great depth. I believe that the supply of water in this field is limited to the size of the open fissures, and that periodic flows of water will be encountered so long as we are in the zone of open cavities. If there is a seepage from the rocks themselves, the amount of water must be so small that it is evaporated as fast as it reaches the air. All the flows of water encountered in these mines have been struck suddenly, generally by boring into vug seams. At Kalgoorlie these seams have been encountered to the lowest depths—1,600 ft. in the Great Boulder Mine and 1,300 ft. in the Lake View Consols. These seams can be traced from level to level, and usually, when the flow of water is struck, a large quantity rushes out for a short period and then stops suddenly, proving conclusively that the supply is soon exhausted. The Kalgoorlie mines are rapidly being drained. The supply of salt water is gradually diminishing; there is not sufficient rainfall or the seepage is not great enough in this region to compensate for the amount pumped from the mines. One of the wettest mines on the field has been the Cosmopolitan at Kookynie. This mine for some time furnished about 400,000 gals. per 24 hours. Within the last fortnight the flow has suddenly dropped to about half that amount.

I have noticed in the Lake View Mine that the water encountered in boreholes comes out in rushes. Such intermittent flows, I believe, have been frequently noticed in artesian wells in other parts of the world. I presume these may be due to either of two causes: The expansive effect of the accumulation of carbonic acid gas, or the syphoning of cavities in the rocks which are periodically filled by a steady stream.

The depth at which we encounter water, in these mines, seems to be no guide to the amount of water to be met with. If an open fissure carrying water is cut in an upper level, the flow is short, but if cut in a deeper level the pressure is much greater and the amount of water is greater. A seam cut the second time at a different level has a pressure corresponding to the difference in levels. This has been tested on the Lake View Mine by means of pressure gauges. We frequently bore into water seams, and without blasting, plug up the hole and put a pressure gauge on the plug, so as to determine what amount of water we may expect. Up to the present time, the Lake View Mine has been comparatively dry, as well as all other producing mines on the field. The biggest water producers about Kalgoorlie are the non-producing mines, which almost surround the producing ones in the "Golden Mile."

Carbonic acid gas is met with in some bore-holes. One in the Lake View Consols has given off this gas for the past two years.

I trust that this information will be of service.

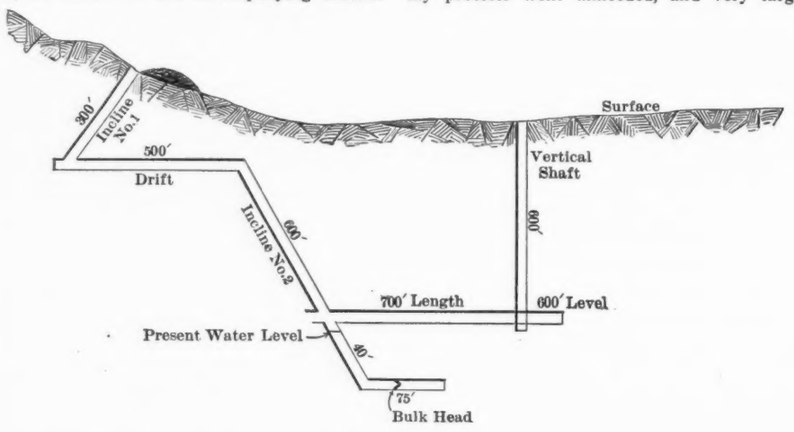
W. A. PRICHARD.

Kalgoorlie, W. A., Jan. 23, 1902.

(We desire to acknowledge the courtesy of the firm of Bewick, Moreing & Co., whose representative, Mr. Prichard, has been so kind as to send the above most valuable data.—EDITOR.)

The Editor:

Sir.—At the Rose Mine, 50 miles east of Victor, San Bernardino County, California, water was struck at 640 ft., as shown on the accompanying sketch.



ELEVATION

The No. 2 incline was sunk 40 ft. below the 600 level, without encountering water, then a drift was run 75 ft., the last 25 ft. of which made water. An attempt was made to bulkhead the drift, but failed, and as the method of bucketing through the two inclines was slow, the drift was abandoned, the water filling back to within 10 ft. of the 600 level. The water undoubtedly came from a channel different from the vein.

H. B. STARBIRD.

Victor, Cal., May 7, 1903.

The Editor:

Sir.—I forward you the following notes as to water in veins:

When I took the superintendency of the Santa Fe Mine, near Matehuala, I found the shaft already 350 meters deep. I do not know at what depth they first struck water, but in my time, with the exception of a small spring of drinking water in one of the upper levels, the whole mine was dry down to the 350-m. level; here the vein gave so much water that direct sinking on it was unadvisable.

The vein, if not actually a contact deposit, is closely related to one and probably caused by the extinct volcano El Fraile. The 350-m. cross-cut from the shaft went through granite or porphyry, not found in upper levels, before cutting into the foot-wall.

In sinking the shaft from 350 to 400 m. considerable quantities of water were met with. I have now no data by me as to the amount, but the sinkers generally worked knee-deep in water, although I was hauling it continuously.

The neighboring Sta. Maria de la Paz Mine, though with deeper shafts, had not then reached the horizon of the bottom of the Sta. Fe shaft, and was dry.

W. ERNEST FRANK.

Altargea, Mexico, May 7, 1903.

THE NICKEL INDUSTRY AT SAULT STE. MARIE.

The Editor:

Sir.—I beg to call attention to an article in your issue of April 25, by E. A. Sjostedt, entitled "Development in the Nickel Industry at Sault Ste. Marie, Ontario, Canada," which is certainly misleading, to say the least. Fortunately for the reading public, my article on "Progress in the Metallurgy of Nickel during 1902," appeared in the same issue, and describes the true condition of affairs at Sault Ste. Marie and Sudbury, and contradicts several of Mr. Sjostedt's statements, skillfully prepared as they have been.

In my capacity of consulting engineer to the Lake Superior Power Company and chief assistant to Mr. Sjostedt, I naturally opposed the adoption of the very peculiar and impracticable methods devised by Mr. F. H. Clergue and E. A. Sjostedt, and gave my reasons therefore. Unfortunately for the company, my protests went unheeded, and very large sums were misspent for roasting works, etc., to utilize the sulphur contained in the Sudbury pyrrhotite ores, although they do not average over 25 per cent sulphur, or much too low, of course, to pay to save for acid-making, etc., in manufacturing pulp.

As stated in my communication, the commercial

impracticability of roasting the Sudbury ores cheaply so as to obtain strong SO_2 gas, and at the same time a dead roast, was demonstrated beyond question. This statement is borne out by the consensus of the opinion expressed by the superintendent of the company's sulphite mill, the company's constructing engineer, and, as far as I know, of all the other engineers and metallurgists who saw the results and figured on the costs. Further evidence as to the mistaken use of pyrrhotite for making sulphurous or sulphuric acid is scarcely needed, so I will merely quote from Peters' "Modern Copper Smelting," pp. 168-169, certainly an authoritative reference. In substance, it states that one of the most serious errors ever perpetrated in the manufacture of acid from pyrites is the attempted employment of pyrrhotite (monosulphide of iron) for pyrite (bi-sulphide of iron). Aside from the greatly lessened proportion of sulphur, 36 per cent, as against 53 per cent, pyrrhotite will not even yield freely what sulphur it contains, but crusts with oxide of iron, turns black, and is soon extinguished when treated in an ordinary kiln. It seems scarcely possible that extensive works for the manufacture of sulphurous acid (or calcium bi-sulphite) from pyrrhotite should have been erected, their ore supply being entirely derived from this mineral, valueless as far as its sulphur contents are concerned; but such has been the case in more than one instance, and will continue to be so in enterprises conducted without the aid of skilled direction. As Mr. J. B. Herreshoff, the distinguished metallurgist, in a letter to me dated May 7, 1900, implied that there is or certainly would be difficulty encountered in properly roasting magnetic fines (pyrrhotite) certainly less than 30 or 35 per cent of sulphur, even in improved roasting furnaces, how much more, of necessity, would this hold true of ores carrying 25 per cent sulphur, as in the case under consideration.

Moreover, the cost of mechanically roasting pyrrhotite ore, as attempted at Sault Ste. Marie, is many times as great as that of the present method of heap-roasting such ores, as carried out, under competent metallurgists, at Victoria Mine and Copper Cliff, without having any sufficient compensating advantage. On the contrary, the ore, on account of its being crushed fine for mechanical roasting, which is not necessary in heap-roasting, is not all in good shape for reduction in blast furnaces, and must first be briquetted, entailing additional expense. Even accepting Mr. Sjostedt's own figures for roasting, $1.86 per ton, this compares very unfavorably with the cost of heap-roasting, which is only about 50c. or less per ton in the Sudbury District.

As regards the making of ferro-nickel, it is evident that Messrs. Clergue and Sjostedt have now entirely discarded their much advertised method of making ferro-nickel by direct reduction of the product obtained in the above roasting process in electrical furnaces, but are going to appropriate the essence of the process patented by Dr. D. P. Shuler, of Sudbury, and reduce the dead-roasted nickeliferous ore in a blast furnace to nickelferous pig iron.

TITUS ULKE.

Johnsonburg, Pa., May 4, 1903.

The Editor:

Sir.—In reply to Mr. Ulke's statement in current issue of the JOURNAL I wish to have it distinctly understood that I consider it of the least importance what possible opinion Mr. Ulke may express as regards our works and processes here, but his article, which appears in the JOURNAL of April 25 is so grossly untrue in all essentials that I felt compelled to avail myself of the opportunity of giving to the public and to the engineering fraternity the true facts regarding the results obtained in connection with our experiments in roasting the Sudbury pyrrhotite, in utilizing the evolved SO_2 gas in the manufacture of sulphite pulp, and in making liquid sulphurous anhydride. These results, obtained after great perseverance and much expense, and now gratuitously given publicity,* must give any one less prejudiced than Mr. Ulke a clear understanding of the practical advantages which we have secured. It is true that many of our most gratifying results were not obtained while Mr. Ulke was on the company's payroll, but this does not justify or excuse his incorrect assertions, many of which have as little thought for truthfulness as his statement now that he was consulting engineer to the Lake Superior Power Company, and my chief assistant. Mr. Ulke, in fact, while employed by our company was engaged in looking up some copper propositions, and at no time was his advice or counsel solicited (except tentatively) in connection with my work, but on account of his contract he was permitted to draw his salary for over two years without giving any adequate returns, and was in July, last year, discharged on account of lowering the dignity of his profession by a most unseemly action, and since that time he has not been in position to obtain direct information as to the work accomplished or as to our future plans. In his article of April 25 and under the general heading, "Development at Sault Ste. Marie, Ont.," Mr. Ulke outlines an electrolytic process of copper-nickel, of which he is the patentee, and goes on to describe how a plant with a capacity of 75 tons electrolytic copper and 7.5 tons electrolytic nickel, and with from 2,000 to 5,000 oz. precious metal, is to be erected here—something, again, which only has its origin in Mr. Ulke's own fertile imagination, as the officers of the Lake Superior Power Company are still unaware that his process is or ever was contemplated.

I need hardly again call the attention of metallurgists interested in mono-sulphide ores to the importance of our results and to the fact that where no theoretical objections exist practical difficulties can be overcome. The metallurgical axiom which Mr. Ulke quotes from Dr. Peters, though true to-day, may be overturned to-morrow.

ERNST A. SJOSTEDT,
Chief Metallurgist L. S. Power Co.

Sault Ste. Marie, Ont., May 14, 1903.

[This controversy is now closed.—EDITOR.]

* See ENGINEERING AND MINING JOURNAL, April 25, 1903, pages 630-632.

THE GEOLOGIST IN PRACTICAL MINING.

The Editor:

Sir.—It is with some hesitation that I venture to take up this subject after it has been discussed by the experts, whose letters have appeared in your columns. I approach it at all only because it seems to me that there is a third party who is interested, besides the geologist and the miner; that is the mining investor; the man who puts his money in mines, furnishing the funds for their exploration and development, though he frequently has himself little knowledge, either theoretical or practical. He has the interest of the pocket in the discussion. He puts in his money, because he believes that there are good and legitimate investments to be found. Sometimes he secures a comfortable profit; sometimes, unfortunately, an uncomfortable loss. What he wants to know is, where can he turn for reliable advice as to placing his money? Scientifically, he may be of very small account; but practically, the miner or the geologist must depend upon him, in nine cases out of ten, for the opportunity to realize anything from their discoveries.

In the first place I am inclined to take Mr. Argall's view of the case rather than Mr. Spurr's. It seems to me beyond dispute that the best discoveries made, and the best opportunities for investment offered, have been by the miner rather than the geologist. The practical miner, who has acquired a working knowledge of geology, has certainly discovered and brought to the investor's notice many mines and districts which have developed into paying properties, while I cannot recall any considerable number whose discovery is due to the scientific geologist. On the other hand, the practical miner has too often shown that he can be led astray by indications which the trained geologist might have rejected as inconsistent with the surroundings.

From my experience in the past I would much rather depend upon the miner, who has worked and has learned something—the man whom Mr. Purington calls the "rock-man"—and who knows pay-ore when he sees it, than upon the geologist who can reason out theoretically what ought to be there—but very frequently is not. Your geologist can explain very beautifully why your ore is there, after you have found it; he does not very often find it. Too many of the excellent monographs of our Survey are what another writer has called them, "obituaries of districts," these do not suit the investor, who wants a live and not a dead mine.

Now, I do not want to decry geology. I have had enough experience in other lines to know the value of theoretical knowledge. The day is past when we can build machinery, run works or mine by simple "rule-of-thumb." The miner must know something of geology if he is going to succeed. But, it seems to me, our geologists work so much on theory alone, that they are apt to disregard fact and experience, where their hypotheses are concerned.

In his admirable letter in your issue of May 9, Mr. J. H. Curle says, "I want to know the net profit in sight in this mine." That is what the investor wants to know; and I do not see how the most beautiful theories of secondary enrichment, or the like, are going to help him. In his first article Mr. Spurr says: "It often strikes one as a curious fact that there is a popular impression to the effect that miners know more about ore-deposits than geologists." Well, this impression has arisen simply because the miner tells us where an ore-deposit is much more often than the geologist does.

If you will pardon a little digression in this rambling letter, it seems to me that Mr. Spurr uses a singularly inapt illustration in one place, where he says: "Once on starting out on a geological expedition, I fell in with a distinguished engineer and bridge-builder. He inquired why I did not take miners along with me, who knew all about mines and ores, and could explain them to me. I doubt whether he would have seen the point had I asked him why he did not get a skilled bridge-workman to draw up his plans for him." That would have been no retort at all. If Mr. Spurr had ever made plans for a bridge—or for a locomotive, or a pumping engine—he would know that the designer must have a thorough knowledge of the skilled workman's part. Otherwise his plans might be full of impossible joints, castings no foundry could make, and welds which would floor a blacksmith.

But this is beside the mark. Now, I do not mean to imply, by my quotation from Mr. Curle, that I invest only in "sure things." I am ready to take reasonable chances and to bear an occasional loss; but I do not want to throw my money away, and I should like to know where to find some guide. Upon the whole, I think that, when I start to climb a mountain it would be better to take as a guide the man who had been there; not the scientist who could tell me in what age the mountain was upheaved, and all about the nature and origin of the glacier on its slope. So I prefer as a guide to a mine the man who has found the ore rather than the one who can supply a theory of the formation of the vein. And I think the great majority of investors will agree with me.

MINING INVESTOR.

New York, May 17, 1903.

PROSPECTING IN INDIA.—According to *Indian Engineering*, for coal, iron ore, copper and limestone, etc., in the Chanda District, Messrs. J. N. and D. J. Tata have obtained an area of no less than 176,314 acres to prospect over, and there is no doubt that with the noted reputation these two gentlemen have for their untiring interest in trying to develop the industrial resources of the country that they will succeed. The former has also a prospecting license for over two square miles of country exclusively for coal, and from surface indications, as also from trials made of samples sent home, it may be safely presumed that coal in the Central Provinces will yet be found in sufficient quantity to make it a most paying commodity.

THE ENGINEERS' BUILDING.

A meeting of the representatives of the five organizations named by Mr. Andrew Carnegie, in his proposition to give to the four National engineering societies, and the Engineers' Club, a building for their joint use and occupancy, was held pursuant to call, at the Engineers' Club in New York City, on the evening of Friday, May 15.

There were present on behalf of the American Society of Civil Engineers, Messrs. Noble (president), Wilgus and Pegram. On behalf of the American Institute of Electrical Engineers, Messrs. Scott (president), and Martin. On behalf of the American Society of Mechanical Engineers, Messrs. Dodge (President), Charles Wallace Hunt and Hutton. On behalf of the American Institute of Mining Engineers, Messrs. Ledoux (President), Dwight and Kirchhoff. On behalf of the Engineers' Club, Messrs. Kafer (President), Redding and Fletcher.

The meeting was called to order by President Kafer, of the Engineers' Club, and on motion Mr. Charles F. Scott, president of the Institute of Electrical Engineers, was elected chairman of the meeting, and Mr. F. R. Hutton secretary.

The chairman opened the meeting by reference to the questions which were to be considered, and called on Mr. Redding for a presentation of some of its legal aspects. After a full and harmonious discussion, the meeting passed the accompanying resolutions:

"1. *Resolved,* That this Joint Conference Committee recommend to the respective governing bodies represented at the conference, that the following resolutions be brought before the several organizations to be acted on:

"2. *Resolved,* That (insert name of organization) unite with (insert the names of the other four organizations), or any of them, for the purpose of accepting the sum of $1,000,000, as a gift from Mr. Andrew Carnegie, for the purpose of erecting suitable buildings for occupancy by various societies of engineers and the Engineers' Club, on the sites secured for that purpose on the north side of Thirty-ninth Street and south side of Fortieth Street, west of Fifth Avenue, in the city of New York, in the State of New York.

"3. *And Resolved Further,* That (insert name of organization) has a very high appreciation of this generous gift of Mr. Andrew Carnegie, and this additional evidence of his recognition of the engineering profession and his deep interest in the welfare of the national societies of engineers and the Engineers' Club.

"4. *And Resolved Further,* That a site on the north side of Thirty-ninth Street shall be purchased and held by trustees, or otherwise as shall be determined by the joint committee hereinafter mentioned for the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Institute of Mining Engineers, or by such of them as shall vote in favor of coming into this enterprise.

"5. *And Resolved Further,* That a joint committee shall be created to be composed of three members of each organization that shall unite in accepting said gift of $1,000,000 from Mr. Andrew Carnegie; and that the governing body of (insert name of organization) shall elect three members of this organization to represent it on and be members of such joint committee; and that the governing body of (insert name of organization) shall have the right and power to remove any member of such joint committee who shall be elected by it and to elect any member of this organization to fill any vacancy that shall occur in such joint committee by reason of the death, resignation, refusal to act or removal of any member who shall have been elected by the governing body of this organization as a member of such joint committee.

"6. *And Resolved Further,* That the character and internal arrangement of the building to be erected on the site on Thirty-ninth Street, shall be determined upon by the affirmative vote of at least two-thirds of all of such of the members of said joint committee as shall represent all of the organizations, other than the Engineers' Club, on such joint committee, and that the character and internal arrangement of the club building to be erected on the site on Fortieth Street, shall be determined upon by the affirmative vote of all of the three members of such joint committee, who shall represent the Engineers' Club on such joint committee.

"7. *And Resolved Further,* That said joint committee shall, by the affirmative vote of at least two-thirds of all the members thereof, select and employ an architect to prepare the plans and specifications for the building to be erected on the site on Thirty-ninth Street, and for the club building to be erected on the site of Fortieth Street; and shall also obtain proposals for the erection of both of such buildings; and shall have power to make and enter into such contract or contracts as shall be approved and authorized by the affirmative vote of at least two-thirds of all the members of said joint committee, for the erection of both of such buildings; and shall have charge of the erection of both of such buildings.

"8. *And Resolved Further,* That said joint committee shall continue in existence until all of the purpose set forth in these resolutions shall have been fully accomplished."

The Secretary was directed to transmit a copy of the resolutions, as passed by the meeting, to each chairman of the constituent committees present, with a request that the latter should transmit the action of the meeting to be governing body of each respective organization. The conference then adjourned, subject to call of the chair.

THE LAST MAN.

By R. W. RAYMOND.

[Read at the dinner in connection with the Scranton meeting of the American Institute of Mining Engineers. Now reprinted from the ENGINEERING AND MINING JOURNAL of February 26th, 1887.]

I am the famed New Zealander
Of whom Macaulay wrote,
And I have cruised around the world
In my own private boat,
A-visiting of London Bridge
And other things remote.

'Twas after I had finished with
The ruins of St. Paul's,
I turned to cross the Atlantic Sea,
In spite of waves and squalls,
To study the traces of vanished races
And see Niagara Falls.

This was the land, you understand,
That once was owned in fee
By folks who worked, and never shirked,
And worshipped Liberty—
A nation that became extinct
In the twentieth century.

From time to time strange rumors came
About their wondrous doom,
Until at last we heard no more
So I resolved to come
And with mine own eyes see the truth,
And tell the same at home.

I steered my vessel up the Bay,
Once famous, and still fair;
A prostrate statue barred the way,
That erst a torch did bear,
Its torch was in the water, and
Its heels were in the air!

I floated slowly up beside
A long-deserted pier,
When at the gangway I descried
A sign, as I drew near,
Upon a signboard old and dried,
"Boycott! No landing here!"

"Boycott!" methought I knew the word;
It was some sort of pest
That in the past, as I had heard,
Went sweeping through the West,
Scaring one-half its victims dead
And starving all the rest.

No matter! Time will disinfect
The most contagious airs;
I put my respirator on,
And washed and said my prayers,
And, boldly stepping to the pier,
Went up the rotten stairs.

An empty town, whose dreary wastes
At human grandeur scoff!
But stay! an aged figure hastes
With many a wheezy cough,
Waving its lean and withered arms,
And wildly warns me off!

My nerves are strong, yet I confess
It was a grewsome sight,
That visage gaunt, that tattered dress
That fiercely brandished right,
Holding a can of some strange mess
That looked like dynamite.

"Art thou the sad survivor, then,
Of all thy nation's fate?
And how didst thou escape it, when
The rest fell desolate?"
"I am," quoth he (and coughed again)
"The Walking Delegate!"

"My duty is to walk about
And see that things stand still;
I snap my fingers—men go out
From road and mine and mill.
At least they did; but now I've none
On whom to work my will.

"Gone are the days when tyrants shrank
And trembled at my talk.
The Boycott took them all away;
And now I sadly stalk,
A lonesome Walking Delegate,
With naught to do but walk!

"It was a glorious fight, I ween,
We Knights of Labor won!
We cut the hours of labor down
To eight, six, four, two, none.
Sometimes I wish it had not been
Quite so completely done.

"Our last great strike the continent
O'erspread from side to side;
We had to boycott everything
To gain the point denied;
And just as we were going to win,
All parties up and died!"

"But you survived," I said; "What power
So safely brought you through?
When no one more did anything,
What could you find to do?
When all support for others failed,
Pray, what supported you?"

Oh! but he grinned a ghastly grin!
"What did I live upon?
Why, I'm a walking Delegate,
And no mere myrmidon!
Though all the world besides should stop
My salary goes on!"

CALCIUM CARBIDE IN GERMANY.—Official announcement is made that the price of carbide of calcium in Germany will shortly be reduced from $12.50 to $10 per ton. It is understood that this decision is attributable to the desire of the continental carbide industry to stimulate the use of acetylene gas for lighting purposes.

ROADS FOR MINES.

BY JAMES W. ABBOTT.*

(*Continued from page 745.*)

To build a road across coarse, or "heavy slide," we make what is practically a dry stone wall for the entire width of the roadbed, covering it with fine stuff to give it a smooth surface. The outside should be laid up with great care, using the heaviest stones available. If the bottom course is firmly bedded a batter of 1-4 will be sufficient.

"Fine Slide," the kind that runs under your feet so that you slip down the hill 9 ins. every time you climb up 12, seems at first to the inexperienced road-builder to be a very discouraging proposition. Fortunately patches of fine slide are never very long. With skill and patience the best kind of a mountain road can be built across them. It calls for a good job of cribbing. The logs, that kind available which rots the slowest, should be not less than 10 ins. in the smallest diameter and carefully peeled. They should be sound and straight, but the length is unimportant if care is taken to make them break joints. The ties should be 8 ft. long, 8 ins. in diameter and also peeled. Logs and ties should be notched on upper and lower side like house logs, but cautiously to prevent weakening. Five feet is a good interval between the ties. Stake out the grade-line, driving the stakes down firmly about 25 ft. apart. For a single track road drive another row of stakes 7 ft. vertically below grade, and for a double track, 10 ft. below. Now level a place on the lower line for the bottom log and bed it firmly. Next cut a trench in which to bed the first tie, sloping it a trifle downwards into the bank. This will take a little time, but practice will soon remove the worst difficulties. A dozen or more pointed bars of inch steel, driven sloping into the bank 3 ins. apart will be very effectual in holding back running slide while digging the trench for a tie. As the ties are all bedded in this manner and the crib built up with a batter of 1 to 4 the slide rock is very carefully filled in behind the logs, and when the grade line is reached there will be a good, solid, thoroughly drained, permanent roadbed, 10 ft. wide for a single track and 16 ft. for a double track. A little fine stuff can be spread over it, if desired to make it smooth on the start. Some fine slide will always be slipping down onto it, and must be kept shoveled out, but this will be a small item of cost. When finally the cribbing has become too rotten to be longer safe it can be renewed without going down as low as at first to begin the foundation.

Where cribbing is used elsewhere than in slide rock the principles for its construction already given will apply. The ties must vary in length to suit the circumstances of the case. The main danger to be guarded against is the liability of the cribbing to be pushed out. The road material working down between a steeply shelving bank and the logs acts as a wedge. If the logs are not held rigidly to their places this wedge will pry them out, little by little, until a section of roadway will go down, probably carrying a team with its driver and load.

Some wood rots more quickly than others, but it all rots eventually, and, however well cribbing may be put in, there comes a time when it goes out.

In Switzerland, where the standard of mountain road construction is very much higher than is usual in the United States, and where trained road builders give faithful attention to every detail, dry stone retaining walls are much used. The doubtful place in such a wall is usually at the bottom. If at all insecure at first, it grows more and more so until it finally gives way at some point and walls, road and all fall out. Water, finding its way between the back of the wall and the filling behind it, eats out a channel wherever it runs. If the foundation is not entirely solid, it will be undermined. The vibrations caused by traffic are an important factor. Because of this treacherous tendency and the various unseen causes which contribute to it, dry stone retaining walls are generally regarded with suspicion and disfavor by men who have had most experience in mountain road construction in the United States. This is not because the principle is at fault. On the contrary, no better, safer, or more permanent roadbed can be built. The difficulty is solely one of cost, and the further fact that elements of weakness from dishonest or incompetent work may be entirely obscured for a considerable time.

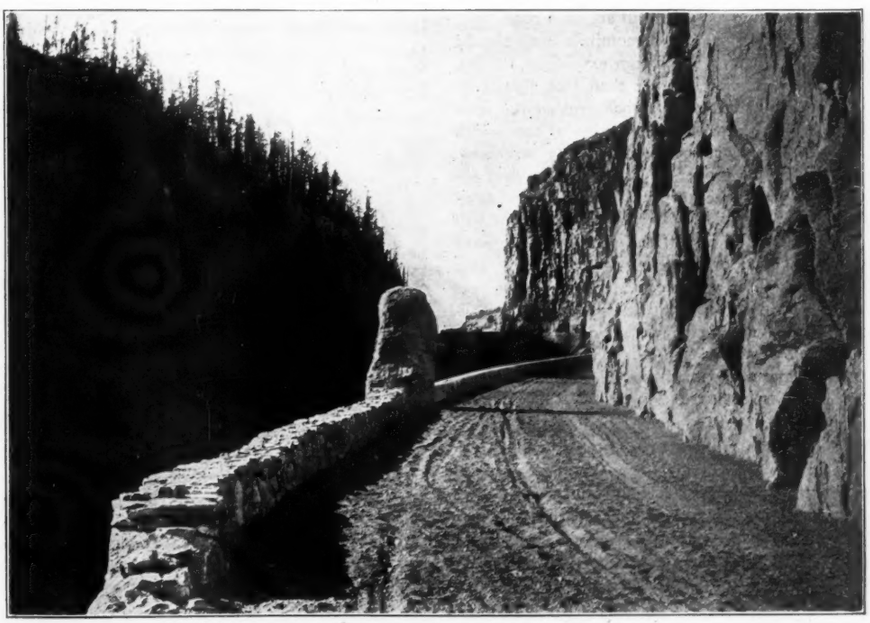
SNOW-SLIDE AND TUNNEL IN COLORADO.

The following described methods of building a dry stone retaining wall, while manifestly expensive, will be found to give permanent and safe results.

First Method.—Make the foundation one-half as wide as the intended height of the wall. Carefully remove all loose material to bedrock, if feasible, and, if not, to at least 4 ft. below the surface of the ground. Build up the wall with the very largest rocks available, carefully filling in the interstices with smaller rock and being sure that everything is firm and stable. If the wall is high it may be given sufficient batter on the rear face to bring the width to 30 ins. at the top, using 1-4 for the outside. Otherwise make the rear face vertical, the top 30 ins. wide and the outside batter whatever it may be to secure that. Fill in behind the rear wall, as it is being built up, with material containing no perishable matter, and being careful that no open spaces are left.

Second Method.—Prepare foundation as before and build up a wall with a thickness one-third its vertical height and a batter of 1-2, filling as the wall rises and carefully tamping all material filled in. This sort of wall becomes, in effect, a homogeneous sheet of rock resting partially on the face of the embankment, which, partly by its weight and partly by its protection against the weather, holds the material of the embankment in place with a much steeper batter than it would naturally maintain.

Where the engineer is tempted to put in cribbing or retaining walls, it is well to always vividly remember that a roadbed on a solid rock shelf is absolutely secure, and will never give way without warning, because of rotten cribbing or an undermined retaining wall. Such a road generally follows the edge of a precipice. Its single track should be at least 10 ft. wide, with its outer edge protected by a guard log not less than 12 ins. in its smallest diameter, firmly bolted to the rock. It is well also to build a strong railing with this log as a base.



PRECIPITOUS SIDE OF MOUNTAIN ROAD PROTECTED BY STONE WALL.

Surfacing.—An ideal road surface is hard and compact in all conditions of weather. In regions

* Special Agent of Mountain Division, Bureau of Public Roads, United States Department of Agriculture.

where the grades are very light this is secured by a top dressing of broken stone or gravel, consolidated, when wet, by rolling with a heavy steam-roller. Roads for mines are generally built in a section of country where the grades are too heavy to get any satisfactory results from a roller, and any consolidation obtained must come from the regular traffic. Some portions of such roads ordinarily have a natural surface which fulfills the required conditions. Other portions need the addition of some foreign material. Some rocks, when broken up into small fragments, if their surfaces, wet, are brought into intimate contact by pressure, possess the property of re-cementing. Rocks containing quite a percentage of lime, magnesia, or iron are known to possess this property to a marked degree. Those with a very high percentage of silica do not readily re-cement when used by themselves, but by adding a certain amount of some other rock a good result can be obtained. Many rocks with a high cementing power are too soft for road dressing, if used alone, and soon grind up into fine particles, which make dust in dry weather and mud in wet. Quartz is the hardest of the constituents of the common rocks and a certain percentage of it is needed to make a good top dressing. Many of the igneous rocks, notably some of the basalts and andesites, give excellent results when used without admixture of other rock. Others, like a majority of the rhyolites and granites, do not. Cherts and calcareous sandstones do. Quartzites, siliceous and argillaceous sandstones and most shales do not. Most of the limestones and dolomites are too soft, if used alone, but when mixed with a granite, or some other tough, acidic, igneous rock, have a very effective cementing value. Much of the fine slide rock which occurs so abundantly in many localities makes a road dressing of the best quality, prepared by nature ready for use. Many of the gravels answer a very good purpose; others when used alone are worthless. Some gravels may be greatly improved by screening out the loam, while others are not fit for use until the larger pebbles and cobble stones are removed, or far better, crushed and intimately mixed with the mass.

If a tough granite is used on a clay road or a limestone on sand, the rock and the road material will bind and produce good results. The appearance of a rock is often deceptive, and actual use is the best test of how any material will act on a road.

A good rock dressing for a mountain road should contain no piece with a maximum exceeding 1½ ins. If it is slide rock pieces larger than that should be screened out; if prepared by a rock crusher the jaws should be set with a maximum opening of that width and the entire product used without any screening. Three inches is the proper thickness for the first application. It will make hard pulling for a few days, but if the rock has good cementing properties it will soon settle down. If any of the wagons in use have wide tires (4 ins. or more), with the front axle shorter by twice the width of the tire than the rear one it will greatly facilitate the process of consolidating the rock and keeping ruts out of the road. For the second application 2 ins. will be sufficient, and after that only enough to fill ruts and chuck holes as occasion requires.

Tools.—The rule that no man can do satisfactory work economically without proper tools finds no exception in road-building. The engineer should know about all devices used in making roads, but in building roads for mines he especially requires suitable road plows, scrapers and spreading carts. Side hill plows with reversible shares are a *sine qua non* if he doesn't wish to do all his plowing uphill whenever the fixed adjustment of the plow so requires. Whatever kind of appliance is used, it is economy to get the most modern, giving special attention to capacity. The foreman on the work should be skilled in removing stumps and liberally supplied with sharp axes, powder and augers. System and proper organization are just as essential for a good record in making roads as they are for running tunnels, or sinking shafts.

Repairs.—All roads should be kept in good condition all the time. In roads, as in everything else, it is the stitch in time that counts. Occasional, spasmodic repairs cost more than regular ones, to say nothing of the inconvenience and loss incurred while bad conditions last.

Material worn out by traffic and washed by rain into the gutters should be thrown away. Its power of cementation is lost, and it is utterly unfit for further use.

ELECTRIC ORE-FINDING SYSTEM.

By Edward Skewes.

An electric ore-finding system, invented by Messrs. Leo Daft and Alfred Williams has been much discussed of late in mining circles in England. The inventors describe the system thus: "It consists of a method whereby metalliferous deposits, invisible to the prospector and undiscoverable by mining engineering, are located, traced and mapped out. The system consists of transmitting inductors which deliver electric waves of a definite length extremely sensitive to the presence of minerals, and receiving resonators tuned to detect these waves and determine their characteristics. The waves from the inductors are impressed upon the crust of the earth, in any desired locality, and are radiated to considerable distances—horizontally and perpendicularly. The area of the ground thus energized is increased or diminished, at the will of the operator, irrespective of the prime energy used. Areas as small as 100 meters square and as large as 30 square miles, or greater, are excited by one inductor. The operator traverses that portion of the energized field to be explored for mineral and constantly receives manifestations of the waves beneath. On approaching a mineral vein or lode, the normal characteristics of the waves undergo a marked variation in intensity or direction (or both); the changes are heard in the resonator and are readily interpreted. When the resonators are over the lode the variation and intensity are greatest. Here some very specific changes take place and by noting density of wave flux, rotation of path and discord, or overtone of the waves, considerable information as to the depth, width and condition of the deposit is obtainable. Veins or lodes which act as insulators as compared with their inclosing rocks, are discovered with the same facility—the surface variations of the wave differing to a considerable extent. Duplicate working is used where necessary. Two fields of force are focussed so that their waves will coincide, at predetermined angle on the area to be investigated for mineral. The phases of the duplex inductors are tuned to produce periodic harmonics."

In June, 1902, Mr. Williams made some experiments with the system at the Cwmystwyth Mines, near Devil's Bridge, in Cardiganshire, Wales, and under date of June 8, Mr. Williams reported "Mount Butt was explored from the west, by throwing out electric waves from midway up Copa Hill across the valley and up the east side of Mt. Butt. Here the variation from normal was most specific and marked. North of Jackilas Gully, extreme concentration of the lines of force was manifest. To the south the attenuation was very noticeable, but direction normal. In the gully, notwithstanding an artificial surface condition created by a dump of rock in the center, which precluded any close observation at that point, the variations of both intensity and direction were so clearly defined that I was able to confidently assure Mr. Gamman of the presence of rich lode ore in the gully between the summit and foot of the hill. A tunnel was at once commenced by Mr. Gamman's instructions, with the result that a good lode of lead and blende was exposed in less than 10 ft. of work. The lode varied in position, quality and angle until the present shows a good, strong reef, with a dip approaching the vertical." And again on July 31, Mr. Williams writes as follows: "Good lead and zinc ore is being mined from the stope in the 36-fathom level in Jackilas Gully from the lode discovered by the Electrical Ore-Finding Company's system in June. A sample assayed by Messrs. Johnson, Mathey & Co., shows lead 57 per cent; zinc 13 per cent; silver 1 oz. 6 dwts. The tunnel in the 25-fathom level, as proposed in last report, has been commenced and driven 24 ft. Numerous stringers have been passed containing lead and blende. These stringers radiate from the lode beyond. In noting the wave characteristics of the Kingside lode on the summit of Copper Hill persistent overlapping fields were observed from the south. Investigation proved this effect to be from an induced field thrown out by the Comet lode. This means that there is considerable metal in the unworked Comet lode, east of the forebreast in present drivage of King's level." Speaking of another vein, Mr. Williams says "waves traversed this lode for two miles, and at the brook Nantycarreggwynion were manifest in the resonators as condenser effects—having been discorded by travel through a metalliferous lode capped with non-metallic material over a considerable distance." Mr. Henry Gamman, the managing director, wrote as follows: "I ought to say at once that had it not been for what your engineers told me I should not have opened up the Comet lode in the 36-fathom level in Jackilas, where after a drivage of less than 3 fathoms we won the lead and blende ore referred to in the first paragraph of the report. The proof that your engineers were correct in their first statement led me to have the cross-cut started on the 12th of June in the 25-fathom level, about 11 fathoms below the original one. I have also wasted money in some very expensive development work here under the advice of mining engineers. Had your instruments been discovered years ago it is my opinion that tens of thousands of pounds would have been saved in these mines alone."

On February 5, 1903, Messrs. Daft and Williams invited representatives of the London press to Gaing, one of the suburbs of London, to see the system tried in a cricket field, where a piece of tin 10 ins. long was sunk in the ground a few inches, and by means of the instrument was found by some of the visitors. Of course, the test could not be called a success, as it savored a little of the old method of the diviner or divining-rod expert who could detect the hat in which a piece of iron was buried from among a large number of hats.

On March 26 and 27 the system was demonstrated at the Telacre Mine, Prestatyn, Denbighshire, North Wales, before about 40 mining men, principally from Wales, a dozen reporters for the leading papers, and several electricians. The mine had not been a success, about $180,000 having been expended by a local company to produce less than $100 worth of lead; and there are no reserves in the mine. Operations ceased about March 15, on account of the lack of funds. The prospects of the mine are anything but cheering, and but few mining engineers would advise their clients to further develop the property eastward. At the breast of the east-drive the vein is simply two knife-blade seams of calcite, and has continued so for the last 50 ft. Cross-cuts have been driven to the north and south, at a point 50 ft. from the breast, but no vein, whatever was found. The breast of the drive is in a very hard chert bed, in nearly horizontal 6-in. layers. In the east drive, about 200 ft. from the cross-cut, a winze had been sunk about 8 ft., in which a little galena was found. The formation is millstone grit and chert beds of the Carboniferous periods. Mr. Williams, after a week's experimenting on the vein eastward, came to the conclusion and informed the directors "that he was certain there is plenty of mineral a little further east" which could be found at a cost of $5,000. Whether that amount has been subscribed I do not know, although one of the local papers says that work there will shortly be commenced.

Fig. 1 is a sketch of the workings above the adit level. Fig. 2 shows a general diagram of the connections used under ordinary circumstances; but in North Wales, the parallel and series spark-gaps were not required, owing to the damp nature of the subsoil. The spark-gaps are not necessary, but considerably expedite prospecting in a dry soil. Mr. Williams claims that with the spark-gaps only as

few hours would be necessary to prospect a district as the same number of days used in a damp soil. The rain in North Wales is proverbial. The use of the secondary battery was to "energize" the inductor coil. The batteries were placed in a small tent near the shaft, and were in triplicate in case of a mishap, but were not needed. From the storage battery a current of 12 volts—30 ampere-hours was used. From the inductor 30,000 volts were transformed to the transmitting electrodes through the condenser. The current used in the experiments was 5 amperes. The inventors state that for heavy prospecting work and for long distances 6 or 7 amperes may be necessary, in order to locate the proximity of the veins, but when located, and to mark the vein within narrow boundaries or side lines, 2 or 3 amperes will be sufficient.

From the batteries insulated wires were carried down the shaft through the cross-cut to the vein, then eastward through the winze where one of the wires was connected to a pin driven in the rock. The second wire was carried to the breast of the drive and connected to a small steel peg by means of a set-screw. The wires were sometimes suspended in the level and sometimes placed on the bottom of the level, the size of wire being No. 20. "Earthing" was effected by means of steel spikes copper-shod, driven about 6 ins. into the ground. One wire, of the third series of wires, was connected with an electrode at surface, placed approximately over the pin in the breast of the drive 150 ft. below. By means of a switch it was possible to work with either pair of wires. Should there be no underground workings, the surface wires would have to be ample and give out the necessary energy. No doubt the position of the electrodes would, in such cases, be determined by the contour and geology of the district.

The machinery in the field consisted of a very light and portable delicately constructed telephone called a "resonator" inclosed in a 6-in. square box 4 ins. deep, fixed on a light telescopic tripod. This resonator is connected with the ground by two wires, to which are attached two movable pegs. The resonator is provided with two ordinary telephone receivers. Fig. 3 is a sketch of the resonator.

The theory of the electrical ore-finding system is not a new one. Robert Were Fox, of Falmouth, Cornwall, in a letter he wrote to the president of the Royal Institution in 1830, called attention to the wave theory, and again in 1834 embodied some of his experiments to the president of the same society, in which he sought to establish that electricity existed between different parts of the same vein. Other investigators in 1834 and 1862 again called attention to the matter, but Messrs. Daft and Williams claim that from the earth's center there are radiating earth-waves, just as the wireless telegraphy system proves there are ether-waves, and the machinery of the inventors records these earth-waves on the resonator. To use a homely simile, these earth-waves radiate like the spokes of a wheel from the hub, and should there be no obstruction, the sound in the resonator may be termed "normal"; but should an obstruction be met with, the waves are thrown nearer to the surface and record an entirely different sound.

The inventors also state that the different metals give different sounds which can be easily distinguished on the resonator. In the experiments, one of the electrodes of the resonator touched a silver coin, a copper coin, a bunch of keys, etc., placed on the ground and different sounds were detected, but I think a trained ear is necessary.

In the experiments the operator placed the resonator in the position which he thought would be most likely on the line of vein, the dip of vein being 15° north, and the normal sound only was noted. The resonator pegs were moved a little and the operator, or any one of the reporters or mining men would listen to the resonator, and if the waves did not communicate district sounds to the ear of the listener, he reasoned that there was no vein, and consequently, the resonator and pegs were removed. In the event of any clear variation of sound from the "normal" the operator sang out "Eureka! Eureka!" When all present would listen to the tick, tick, tick, in the resonator. The ticking was unmistakable, the most sceptical was convinced of that, but without fully understanding the cause. Mr. Williams stated "that the line of greatest intensity is at right angles to the line of vein, that the strength of the current

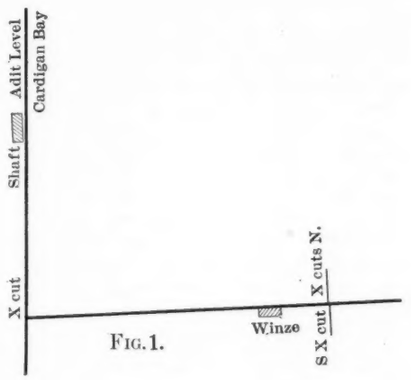


FIG. 1.

is inversely to the square of the distance from the transmitting inductors."

An interesting experiment showed what little effect conductors on the surface had on the current. The fences around the clumps of trees and the fields were

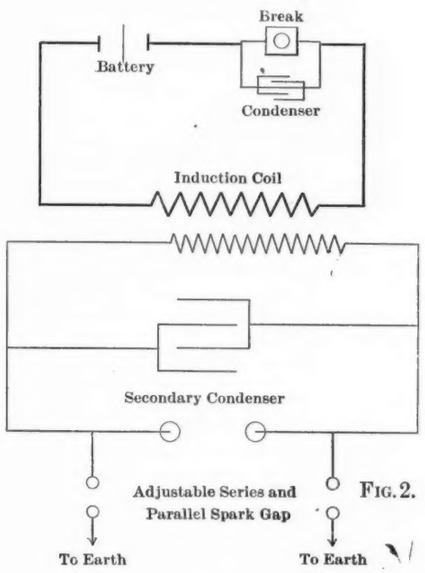


FIG. 2.

purely American, save that the ordinary, instead of the barbed, wire was used. It was found that when one of the resonator pegs was connected to either of the fences, a much louder ticking was heard

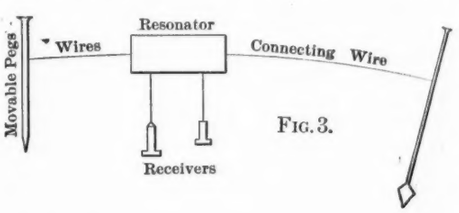


FIG. 3.

than when the peg was in the ground. It was thought that the fences were collecting current from the energized earth, and by discharging it in the resonator it indicated the presence of a vein. Mr. Williams short-circuited the fence and conclusively showed that an iron fence is no obstruction to prospecting by the system. He also stated that eastward from the breast of the drive there was a fault which has thrown the lode south and that beyond the fault the mineral will be found; surface data gave no reason for such a statement, the soil being from 10 to 12 ft. deep.

The resistance between the two surface electrodes was 2,000 ohms and the resistance between the two underground pegs was 82,500 ohms. The machinery in the tent, according to the electricians present, was simply perfect and of the highest order; some of them expressed a fear that the machinery was too delicate for the rough usage which it would most likely receive in a prospector's camp.

The question is: Can the electrical ore-finding system be applied? I think it has possibilities. The resonator may be improved, perhaps at the expense of simplicity, by the introduction of an indicator to record the intensity and volume of the obstructions of the earth-waves. The system is one that may be adapted by very scientific persons. After years of study and experimenting, it may become of service in the prospecting for lodes.

At present, I cannot regard it as other than a divining-rod, based on scientific principles. The rod, but in the hands only of certain men, will tell of anything abnormal near the surface; the resonator will unmistakably do so to all who listen. The divining-rod cannot distinguish between quartz, copper, lead, tin, gold, silver, etc.; neither from the experiments conducted at Telacre Mine, can the inventors of this system. The divining-rod has not been improved during the hundreds of years it has been in use. This system can, I think—I am not sure—that the system can find lodes at a greater depth than the rod, and that the operator may be able to approximately give the depth. I know diviners, some of whom at least claim they can tell the kind of mineral, depth, etc., but I have never seen them prove their statements. Nearly all lodes are conductors, and the inventors claim that over the metalliferous part there is a concentration of the waves which the resonator detects.

Mr. P. F. Wynne, manager of the Minera Mining Company, asked Mr. Williams if there was a barren vein, would there be a different sound on the resonator, and the answer was "yes." Several other questions were asked by the engineers present, and the replies were not always conclusive. The spectators were told that the oxides and carbonates of the metals had but little influence; that the soundings from quartz and calcite were almost inaudible, that it would be hard to distinguish between a small deposit of ore near the surface, and a large deposit at a greater depth.

Capt. Charles Thomas, more than 60 years ago, wrote "that it was easier to tell where there is not a good vein than where there is." The electrical ore-finding system may be useful at present in giving negative knowledge, as after all, it is the negative knowledge which costs in all mining operations. On the other hand, can there be a positive without a negative? Is there a possibility of this system doing for metalliferous mining what the Roentgen ray is doing for surgery and for adulterations?

Prospectors do not want a system to discover lodes, as lodes are abundant. Mr. H. F. Collins stated, "I can show 150 different lodes in the county of Denbighshire alone, which have been worked and abandoned." Prospecting, even in new counties, although pioneer, is not difficult work; the difficulty is in finding rich lodes, and the system has not demonstrated, at the Cwmystwyth Mines, that it can do so. As the resonator is at present constructed, I do not see how it can. We were told that every vein obstructs the earth-waves and that this obstruction is recorded; we also know that not one vein in one hundred is remunerative.

The problem which Messrs. Daft and Williams have faced is one of great difficulty. The earth's crust is not as homogeneous as an egg-basket, and the veins not as mathematically arranged as they are on the mining maps of West Africa, so under actual existing conditions, there are other combinations and obstructions that must be analyzed and interpreted. Granted that the sound is a clue to the existence of a vein, two or more lodes might produce a sound

which could easily be mistaken for an imaginary vein, away from the real veins. What about two veins at different angles, or even cross veins, cross-courses, dikes, faults, etc., which are invariably met with? The inventors showed unmistakably that in certain parts of the field there was an unusual sound in the receivers of the resonator, but I hardly think that even that should be proof that a payable lode existed beneath at the place indicated. I cannot see, at present, how the system can be used to determine, with accuracy, the character, depth, richness, etc., of the vein; and until such time as the Telacre Mining Company have demonstrated the existence of lead at the selected spot, the Scotch verdict of "not proven" is applicable to the radiated earth-wave theory; for, after all, may not the indications in the radiator be due to conduction and not to radiation?

GEOLOGY OF SOME COPPER DEPOSITS IN ALASKA.

By Blamey Stevens.

Latouche Island in Prince William's Sound (near the mouth of the Copper River) has some copper deposits, which are very interesting from a scientific point of view.

The island consists of alternating strata of slate or shale and porphyry, striking about true north and south, and dipping, as shown in the cross-section, Fig. 1. Pyrrhotite is found in small grains throughout these rocks, but occurs massive only on the western sides of the porphyry belts. This rule applies over the whole length and breadth of the island, which is 15 miles by 4 miles.

The term "basic magmatic segregation," unwieldy though it is, does not fully classify these deposits, since gravity has evidently been the means of bringing the pyrrhotite masses into their present positions, on one side only of the porphyry belts or

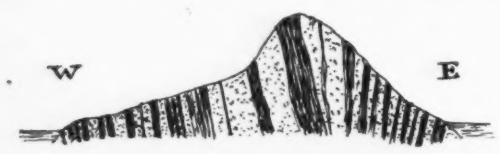


FIG. 1.

sheets; this is important, since it saves the necessity of prospecting the other contacts.

Although segregation is not carried to the extremes as in cases mentioned by Mr. Spurr in the Yukon pegmatites or in some I have noticed in southeastern Alaska, there is ample evidence that the pyrrhotite has been acted on by gravity, after being precipitated from magma which, becoming supersaturated by gradual cooling, could hold less and less of it in solution. In this case the deposition by the aid of gases above the critical temperature, as assumed by Mr. Weed for pyrrhotite deposits in general, is entirely out of the question.

The best example is that in the vicinity of the Bonanza claim, which is here shown in plan, Fig. 2, but if considered a vertical section would show how the strata lay when the basin-like deposits of pyrrhotite were first formed.

As far as can be seen from present development on the island, copper pyrite, in grade which would pay to mine, occurs only as a secondary product in breccias and seams adjacent to fault disturbances; there is little or no quartz so that the fissures are left unfilled and the copper occurs as bodies of mineralized porphyry, though the miners refer to the pyrrhotite contact mineralizations, which only contain a very small percentage of copper, as veins.

OIL ENGINES FOR A WAR VESSEL.—The St. Petersburg correspondent of the *London Globe* states that Russian naval circles are interested in an experiment which is about to be carried out on a torpedo-destroyer of 350 tons displacement. The Ministry of Marine ordered from a German firm a naphtha engine, which is capable of developing 6,000 indicated horse-power. This oil motor is the invention of an engineer, M. Lutzky.

THE SYNTHESIS OF CHALCOCITE AND ITS GENESIS AT BUTTE.*

By Horace V. Winchell.

Since 1880 the mines of Butte, Montana, have produced approximately 1,250,000 tons of fine copper. They are now yielding about 200,000,000 lb. per annum, and have attained a maximum depth of 2,200 ft.

Notwithstanding the statements of some writers on ore-deposits,[1] the copper ore of this mining camp is not chalcopyrite, nor is this mineral at all common here. Indeed, it is about as rare as covellite, and a good specimen of either is difficult to procure.

Chalcocite is the principal copper mineral, although bornite and enargite are common; and it is probable that more than 75 per cent of the total output of Butte copper has come from the smelting of the mineral chalcocite or copper glance. It is found in all the mines and on all levels from the highest unoxidized level to the bottom workings. It occurs in small crystalline specks, in black powder and in massive veins, sometimes many feet in thickness and of most remarkable vertical and lateral extent.

A study of the veins and ores and the paragenesis of the various minerals furnishes convincing proof that the copper glance is one of the latest minerals to be formed in the veins. It occurs crystallized or massive upon pyrite, quartz, zinc blende, altered

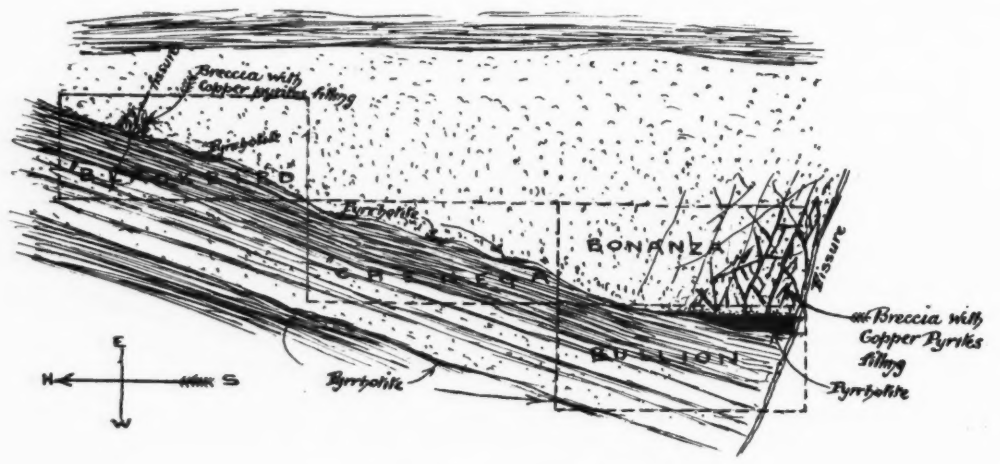


FIG. 2.—COPPER DEPOSITS IN ALASKA.

granite and enargite. It fills fault-crevices and fractures either in the veins or the country rock. It is also found in extremely thin films on pyrite, chalcopyrite, covellite and blende, as well as upon the non-metallic rock and vein minerals.

The lodes themselves are quartzose veins, and represent more or less completely replaced country granite. The nature of this granite has been fully described by Mr. W. H. Weed.[2]

There have been two or more separate periods of fracturing and mineralization in the copper area; but chalcocite is found in the fractures of all ages. It is frequently found cementing vein minerals like pyrite, which may have been broken apart by earth movements or internal strains. It is also found in great purity and abundance associated with the clay "gouges" of strike, or cross-faults, where there is the best opportunity for the circulation of waters from the surface. As depth increases the percentage of pyrite and enargite increases in comparison with that of chalcocite. While the ores of the camp as mined may have averaged 8 per cent, or even 10 per cent copper for the first thousand feet from the surface, they will not exceed an average of 6 per cent copper for the second thousand feet of vertical extent. It is impossible to arrive at exact figures as to the ratio of chalcocite to total copper; but it is a fact that the percentage of chalcocite is decreasing, and that of enargite increasing, with the depth of the mines.

Coming now to the question of the genesis of this chalcocite, it should be borne in mind that copper glance or chalcocite is cuprous sulphide (Cu_2S), and that covellite is cupric sulphide (CuS).

It should also be remembered that hydrogen sulphide and soluble sulphides normally precipitate CuS (not Cu_2S) from copper solutions, whether acid or alkaline.[3] Cupric salts, with an excess of hydrogen sulphide, always yield an appreciable amount of cuprous sulphide;[4] and it is known that solutions of cupric salts are reduced to cuprous salts by boiling with sulphurous acid.[5] Moreover, sodium thiosulphate added to hot solutions of copper salts gives a black precipitate of cuprous sulphide.[6] It, therefore, becomes at once apparent that the precipitating agent in these veins cannot have been a soluble sulphide, unless there were at the same time a reducing agent strong enough to reduce the cupric sulphate to cuprous sulphate and precipitate cuprous sulphide, and not strong enough to reduce it to native copper.

The mineral chalcocite has been formed both artificially and naturally in recent times; and is referred to by numerous writers as follows:[7]

Daubree[8] found chalcocite crystals accidentally developed on coins and copper instruments which had lain for a long time in damp ground, as at Bourbonnes-les-Bains, Plombieres, etc.

De Gouvenain[9] found crystals of copper glance on fragments of copper which had been for some time in the warm spring of Bourbon-l'-Archambault.

Rammelsberg[10] discovered two small cubical crystals in furnace product from Mansfield, containing iron, nickel, cobalt, zinc and manganese isomorphous with the copper.

Scheerer[11] found small rhombic crystals supposed to be chalcocite in a reverberatory furnace at Freiberg. Mitscherlich[12] obtained octahedral chalcocite artificially by melting a proper mixture of copper and sulphur. Durocher[13] reproduced the rhombic variety by heating in a red hot tube vapor of copper chloride and sulphuretted hydrogen.

Becquerel[14] obtained copper glance in hexagonal plates by the same method which he employed in the formation of galenite. Senarmont[15] obtained only an amorphous precipitate by warming to 200° in a

* A paper read before the Geological Society of America, February, 1903.

[1] Ed. Fuchs et L. DeLaunay "Traite des Gites Mineraux et Metalliferes," II, pp. 263,265. Eissler, "Hydro-Metallurgy of Copper," p. 29.

[2] *Journal of Geology*, Vol. vii, No. 8, pp. 737-750.

[3] Douglas and Prescott's "Qualitative Analysis," 7th Ed., p. 89.

[4] Brauner, C. N., 1896, 74, 99; *Comptes Rendues*, 1881, 98, 1492.

[5] Kohner, *Chemiker Centralblatt*, 1886, 813.

[6] Vortmann, *Monatshefte fur Chemie*, 1889, 9, 165.

[7] Fouque and Levy, "Synthese des Mineraux des Roches," p. 294; M. L. Bourgeois, "Reproduction artificielle des mineraux," 1884, p. 38; Meunier, "Methodes de Synthese en Mineralogie," 1891, pp. 69, 75.

[8] Daubree *Comptes Rendues*, vol. lxxx, 1875, 461.

[9] De Gouvenain, *Comptes Rendues*, vol. lxxx, 1875, 1297.

[10] Rammelsberg, "Metallurgie," p. 224.

[11] Scheerer, "Hutten-Erzeugnisse," p. 366.

[12] Mitscherlich, *Poggendorf's Annalen*, xxviii, 1831, 157.

[13] Durocher, *Comptes Rendues* xxxii, 1851, 825.

[14] Becquerel, *Comptes Rendues* xxxii, 1852, 38.

[15] Senarmont, *Annalen Physiker Chemie*, xxxii, 1851, 129.

sealed tube a mixture of copper sulphate, bicarbonate of soda and potassium sulphide. Copper heated to 200° in a closed vessel, in presence of a solution of sulphurous acid according to the method of Geitner, did not yield satisfactory results. Under similar conditions a solution of copper sulphite yielded crystalline scales differing from chalcocite in composition, perhaps covellite.

Margottet[16] obtained crystallized copper glance by the slow passage of hydrogen charged with sulphur vapors over copper at red heat.

Meunier[17] speaks of the employment of solid precipitants, saying that the reaction in such cases is slow, and favorable for crystallization, and moreover reproduces conditions frequently found in nature. He thus obtained crystals of cuprite, alunite, copper, cotunnite and matlockite. He is convinced, as the result of many experiments, that the natural sulphides in the presence of suitable metallic solutions reduce the metal dissolved to the metallic state; and instances the coating of gold which is deposited on galena when immersed in auric chloride, and of silver when galena is immersed in nitrate of silver. All the sulphides which he has examined produce similar metallic precipitates.

The usual explanation given for the formation of copper glance on coins in spring waters is that it is due to the reducing action of carbon.

In his "Mineralogie de la France (Vol. II, p. 515), for example, A. Lacroix, in describing the copper sulphide minerals found incrusting old bronze coins in the springs of Bourbonne-les-Bains,[18] says:

"The chalcocite formed in thermal springs or in fresh water at the expense of Roman coins is explained by the action on the bronze of soluble sulphides, themselves the product of the reduction of sulphates by organic material."

Organic matter is present in the mine waters of Butte; but is not able to reduce all the ferric sulphate to ferrous sulphate, much less have any appreciable effect on the copper salts.

After considering the geological history and physical structure of these ore-deposits, the writer came to the conclusion some three years ago that the copper glance was formed by a chemical reaction between copper sulphate in solution in descending waters and the iron pyrites and other primary sulphide minerals lying below. In order to ascertain the truth or falsity of this theory laboratory experiments were undertaken by the writer and carried on by Messrs. S. J. Gormly and C. F. Tolman in the laboratories of the Anaconda Copper Mining Company.

The first experiments were conducted with a relatively small amount of cupriferous pyrite and a dilute solution of copper sulphate. The results, as reported, show the formation first of SO_2, and then of H_2SO_4 the solution of both copper and iron and the precipitation of the iron as ferric hydrate, and the formation of copper sulphide.

Analyses of the mine waters showed no ferrous salt in the strong "copper water," but disclosed the presence of quantities of cuprous salts, in acid solution.

The experiments repeatedly showed that SO_2 is formed by the action of pyrite and chalcopyrite upon $CuSO_4$; and that the SO_2 reduces some of the copper ions of the $CuSO_4$ to the cuprous form. According to theoretical chemistry, a relatively insoluble compound may be precipitated by very small amounts of a salt containing one of the ions of the insoluble compound, if a large amount of the salt containing the other ion is present. To test this, a solution of copper sulphate was treated with the sulphides of arsenic, lead, copper, iron, zinc and with pyrite; and in each case copper sulphide was precipitated, proving that these sulphides may precipitate copper sulphides from solution of a copper salt. It is probable also that the more insoluble the precipitating sulphide, the more concentrated must be the solution of copper sulphate.

[16] Margottet, *Comptes Rendues*, lxxxv, 1877, 1142.
[17] Meunier, op. cit. 308.
[18] Daubree, *Annales des Mines*, viii, 439, 1875.

To produce a solution containing cuprous ions the above mentioned sulphides were treated with a solution of copper sulphate ($CuSO_4$) and SO_2; and precipitates were formed in each instance. An analysis of the precipitate formed by copper sulphide showed a precipitation of 12 per cent of the weight of the original CuS as Cu_2S, indicating the formation of chalcocite under these conditions.

It was not ascertained whether the iron salts will reduce enough copper to form Cu_2S in presence of pyrite or other sulphides, or whether the SO_2 formed by solution of the pyrite and other sulphides is the active agent.

Knowing full well that it might be urged that the formation of a precipitate of a certain chemical composition is quite a different matter from the production of a mineral having the same composition, the experiment now about to be briefly described was undertaken and carried to completion with exceedingly gratifying and satisfactory results.

In a slightly acid solution, containing sulphurous anhydride (SO_2), was digested pyrite (FeS_2) at ordinary temperature and pressure for three months. The pyrite taken was ordinary "jig concentrates" about one-fourth of an inch in diameter from the Parrot concentrator at Butte; and of the following composition:

SO_2	8.30
CaO	Trace
MnO	None
Fe	41.20
Cu	1.50
Zn	0.20
S	48.70
	99.90

Dividing these results by the molecular weights, the molecular constitution is represented as follows:

Fe	0.736
Cu	0.024
Zn	0.003
S	1.522

After standing for three months in an ordinarily well-lighted room enclosed in a sealed jar, to exclude the atmosphere, the formerly yellow grains of pyrite were completely plated with a solid coating of a dark blue-black mineral, and so closely resembling grains of solid chalcocite that they can only be distinguished from the latter by breaking them open; while in another jar which stood alongside, similarly sealed and exposed to light and ordinary temperature, containing pyrite and copper sulphate solution (but no SO_2), the grains of pyrite were just as bright and yellow as before they were immersed. Indeed, there has been no visible alteration on the surface of grains which have now been thus immersed in copper sulphate without SO_2 for two years, while in an adjacent jar containing SO_2 there has been formed what appears to be, and undoubtedly is, a fine coating of chalcocite.

From the first jar there were taken some of the larger grains for analysis; with results as follows:

SiO_2	9.60
CaO	———
MnO	———
Fe	40.10
Cu	3.60
Zn	———
S	46.30
	99.60

(CaO, MnO and Zn not determined.)

The molecular constitution is now Fe, 0.716; Cu, 0.057, and S, 1.448. There are .016 equivalents of sulphur left over (after calculating the iron as FeS_2) to unite with the copper. The exact theoretical amount to form Cu_2S is .014; and the surplus sulphur may be combined with zinc, lime or manganese. That the mineral coating thus formed on the jig concentrates is clearly chalcocite cannot be doubted from a mere inspection of the samples, and comparison with ore from the mines.

EQUATIONS.

The chemical changes involved in the oxidation of pyrite have been discussed by S. H. Emmens[19], and by Penrose,[20], and more recently by Van Hise, Weed, Emmons and others, and the equations given indicate the formation of sulphur and sulphurous anhydride as a product of such oxidation.

The real agency of this SO_2 and its probable role as an active reducing agent capable, for example, of reducing cupric sulphate to cuprous sulphate preparatory to its deposition as cuprous sulphide seems to have been overlooked. The equations given by Emmens are as follows:

"1. $FeS_2 + O_3 + H_2O = FeS + H_2SO_4$
"2. $FeS + H_2SO_4 = FeSO_4 + H_2S$
"3. $FeS_2 + O + 2H_2S = FeS + 2H_2O + 3S$
"4. $S + O_2 + H_2O = H_2SO_4$

"That is to say, the oxygen of the atmosphere and the moisture of the ground and air convert part of the sulphur into sulphuric acid and leave a residue of iron monosulphide, which is then attacked by the sulphuric acid with formation of ferrous sulphate and evolution of sulphuretted hydrogen. This latter reacts with the sulphurous anhydride formed (together with sulphuric acid) by the oxidation of the sulphur in the marcasite, and produces water and free sulphur, the latter of which is in its turn oxidized and produces a further quantity of sulphuric acid, and so on. Hence, as the result of the first attack on the ores we should expect to find ferrous sulphate, sulphuretted hydrogen, free sulphur and sulphuric acid.

"Now, a solution of ferrous sulphate eagerly absorbs atmospheric oxygen and sulphuric acid to form ferric sulphate, thus,

$$2FeSO_4 + O + H_2SO_4 = Fe_2(SO_4)_3 + H_2O$$

and, therefore, although I have spoken of ferrous sulphate and free sulphuric acid as among the first results of the gossan-forming action, they are rapidly converted into a solution of ferric sulphate; and it is in this latter form that they are usually found in mine waters and the like. In some cases, however, where local circumstances impede peroxidation, ferrous sulphate remains in considerable quantity, as, for example, in the manufacture of copper by exposing large heaps of pyrite to the action of the atmosphere and moisture.

"Let us next consider what will be the action of the ferric sulphate upon the remaining ferrous sulphide. This is shown by the following equation:

$$FeS + Fe_2(SO_4)_3 = 3FeSO_4 + S$$

or, in other words, one molecule of ferric sulphate will abstract one molecule of iron from ferrous sulphide, forming 3 molecules of ferrous sulphate and setting free the sulphur."

The essential part of these operations may be expressed in a condensed form, as follows:

1. $FeS_2 + H_2O + 6O = FeSO_4 + SO_2 + H_2O$

The SO_2 perhaps aided by the ferrous sulphate, reduces a portion of the copper, as follows:

2. $2CuSO_4 + SO_2 + 2H_2O = Cu_2SO_4 + 2H_2SO_4$

The acid solution would perhaps form H_2S by attacking the pyrite; and CuS would be formed, except for the presence of the SO_2, which holds the copper in the form of cuprous sulphate, and makes the precipitate cuprous sulphide. Or, if H_2S be not formed by the acid present, and if the Cu_2S is more insoluble than FeS_2, there would be a precipitation of Cu_2S, and a solution of iron as sulphate.

3. $FeS_2 + H_2SO_4 = FeSO_4 + H_2S + S$
4. $Cu_2SO_4 + FeS_2 = FeSO_4 + Cu_2S + S$

In nature the oxidation of pyrite sometimes leaves residual sulphur, but usually the sulphur is oxidized and again taken into solution.

It will be observed that the solutions here employed are all acid solutions, and contain no alkaline

[19] ENGINEERING AND MINING JOURNAL, Dec. 17, 1892, p. 582.
[20] *Journal of Geology*, 1894, pp. 288-317.

carbonates. This corresponds with the conditions actually existing in the Butte mines now, and for a long period of time since the flows of ascending waters ceased and the work of oxidation and erosion began. It seems probable that the waters which have thus deposited chalcocite as a secondary mineral have in most cases been acid waters, and that their movement has been downward. It does not necessarily follow, however, that chalcocite cannot be formed in any other way. In fact, it is quite possible that ascending alkaline solutions containing copper might deposit chalcocite as a primary ore. In that event, we should almost certainly find hematite formed as an associated mineral. And, indeed, this oxide of iron has been reported from some mines under conditions which preclude the supposition of its origin through the action of descending waters. No hematite, however, is found in the lower levels of Butte mines, nor have indications of alkaline carbonates been found in considerable quantity.

At many points in the mines of Butte are found ores precisely similar in appearance to those thus produced synthetically. Frequently these ores are at first supposed to be pure chalcocite, but, on analysis, prove to be low grade, and on breaking disclose at once an interior of solid pyrite and a mere surface film of copper glance.

So far as I am aware this is the first account of the synthesis of chalcocite in the wet way; and the first time it has been experimentally demonstrated that important sulphide ore-deposits are enriched far below the surface of the ground-water by reaction between oxidized solutions from above and the original sulphides.

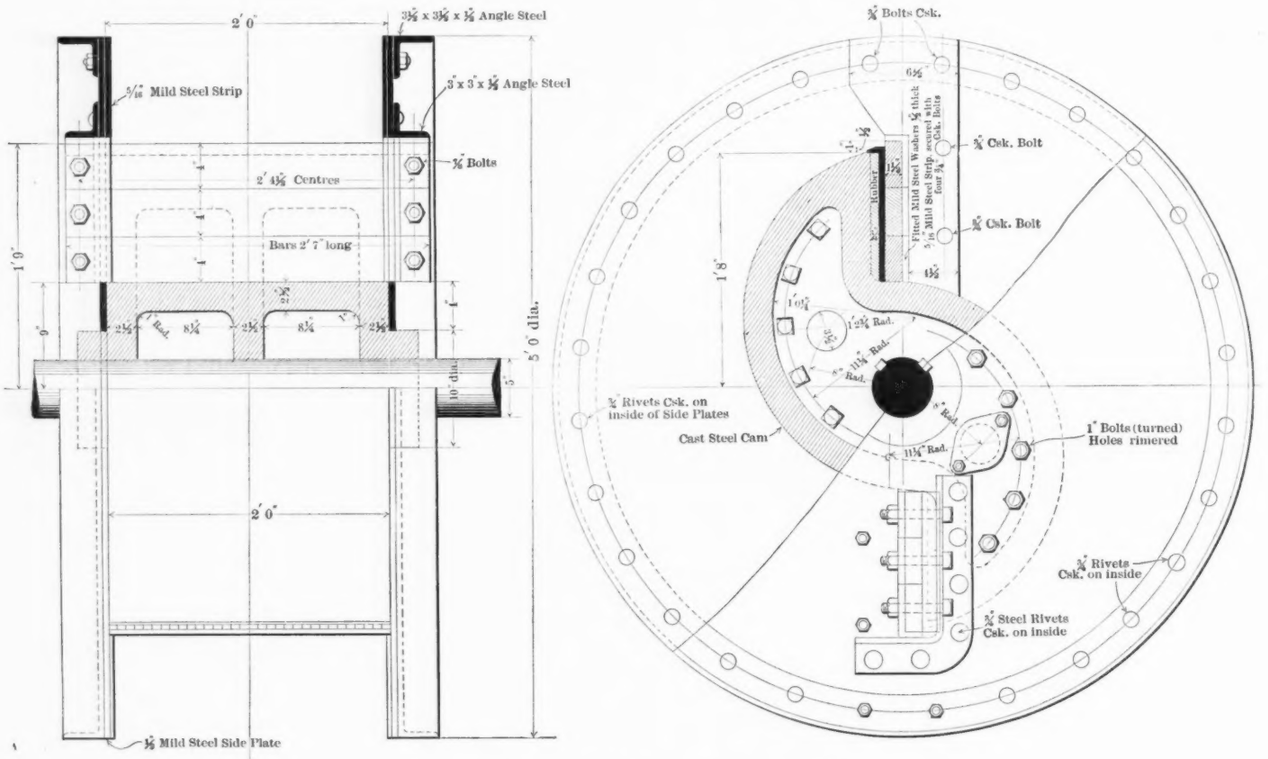
ASBESTOS IN SIBERIA.—United States Consul General W. R. Holloway writes from St. Petersburg: "The *Official Messenger* states that rich mines of asbestos have been discovered in the Irkutsk District in Siberia, 1½ miles from the Kitoy River, and a company has been organized to develop them. Preliminary tests are said to show that at a depth of 1 ft. the asbestos is equal in quality to the Canadian and superior to the Alpine product."

PECK'S CENTRIFUGAL ELEVATOR.

By F. Danvers Power.

Mr. Walter Peck, formerly of Dunedin, New Zealand, but now of Sydney, New South Wales, has designed a new tailings elevator to supersede the usual heavy and costly ladder type used on board gold dredges. It consists of two to four beaters made of cast steel, which bear a general resemblance to the cams of a stamp-battery. The faces of the beaters are about 2 ft. wide by 1 ft. deep, and the circle described by them is from 3 to 6 ft. in diameter, according to the height it is desired to stack the tailings, for the greater the diameter the greater the circumferential velocity. The machine is driven at the rate of 240 revolutions per minute. In the larger machines the faces of the beaters have about the same area as those of the smaller machines, the greater diameter being obtained by increasing the size of the boss. The beaters are shrouded with mild steel disks, which project above them on either side, so as to confine the stones fed to the machine. The faces of the beaters are made radial, for if in any other position the stones have a tendency to drag upon the surface of the beaters, thereby wearing them away quicker. The back of the beater is curved in such a manner that if a stone misses the face of one beater, it has not time to strike the back before the face of the next beater catches it and flings it away. The beater faces are composed of strips of hardened steel placed crossways, and fastened outside the shrouding by bolts which cannot be hurt and are easily manipulated. The slots in the shrouding, through which these wearing plates are removed, have to be fairly large in case the edges of the plates become burred; when the elevator is in working order the clearance in the slots is filled by a plate washer. The wearing plates of each beater are backed by a half-inch plate of mild steel with a lip on the upper part; between this and the beater casting is a sheet of three-quarter inch india rubber, which serves the double purpose of making the throw more elastic, thus giving better results and preventing a jar to the beater casting. The lip on the plate next the rubber is to help keep the compressed rubber in place. The wearing plates get spread out on the outer surface, on account of the constant hammering they get by the stones, and in consequence the plates become curved, as the inside surface retains their original size, thus forming a hollow behind the plates, and the iron backing; so the wearing plates have to be reversed occasionally. The machine is not made more than 2 ft. wide in order that large stones may slide off the flanges of the shrouding instead of striking the beaters. Should the machine be desired to deal with a larger quantity than one 2 ft. wide can manage, then it is duplicated. A machine 2 ft. wide and 3½ ft. in diameter, can easily deal with 50 cub. ft. per minute. The only wear on the side of the machine is just near the beaters, so these parts are protected by renewable steel liners. The cost of renewing the beaters on the Ngapara No. 1 dredge, New Zealand, the first on which this elevator was tried, did not exceed $5 per month.

The stones from the screen are fed by an adjustable shoot (placed between the revolving screen and the centrifugal elevator) onto the face of the beat-



THE PECK CENTRIFUGAL TAILINGS ELEVATOR.

ers. The angle that the chute makes is generally about 50° from the horizontal. As the stones are carried a little way up the side of the screen as it revolves, the shoot is placed out of center with the screen so as to ensure an even distribution of the tailings onto the elevator beaters. The stones are struck with terrific force by the beaters, and are projected in the required direction, according to the set of the feeding chute. This elevator spreads the tailings evenly, instead of in a series of little heaps, like the ladder elevator. The force required to deliver stones a given height by this elevator is practically that which a stone would develop in falling from that height, plus 1 in 30 for wind friction. In cases where the elevator is driven by the main engine, a free wheel device is used, consisting of a ratchet or pawl to take up the momentum should the machinery stop suddenly.

The advantages this centrifugal elevator has over the ladder elevator are, it is claimed:

1. It is considerably cheaper in first cost.
2. The wear and tear is slight.

3. Being very much lighter, the size and cost of the dredge hull is considerably reduced.

4. The only wearing parts can be quickly replaced during the ordinary stoppage for oiling purposes.

5. The power required is not so great.

6. The tailings are stacked more evenly. The heavier stones form the foundation on which the balance of the tailings are spread. The usual angle of rest for the tailings heaps is from 30° to 32°. Sand is only stacked 55 per cent as high as if the elevator is fed purely with stones.

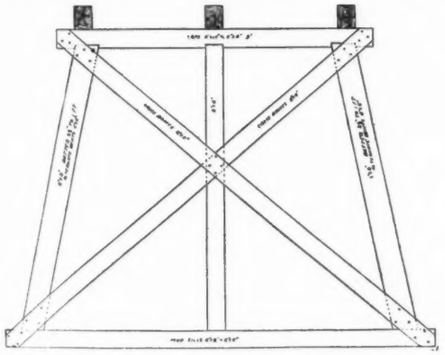
This elevator has been fitted to the following dredges and is giving great satisfaction: The Ngapara No. 1 and Earnscleugh No. 1 at Alexandra, N. Z.; Gibbston G. D., Island Block, Junction Electric and Rising Sun in Otago, N. Z.; the Wangapeka, Nelson, N. Z.; and the Araluen Central, Araluen, N. S. W.

FLUME CONSTRUCTION.*

By W. C. RALSTON.

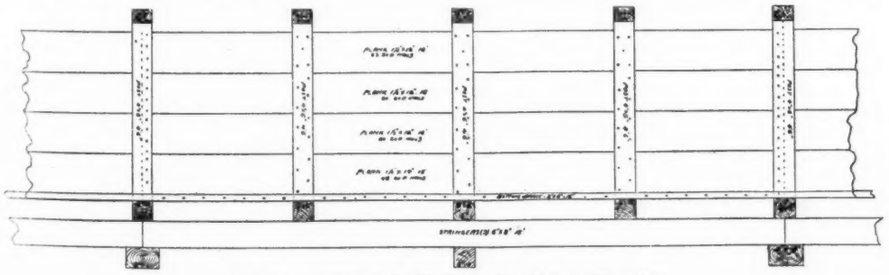
When the Melones Mining Company contemplated building a power plant on the Stanislaus River, at Melones, in Calaveras County, the building of a large flume to carry 4,000 miners' inches of water[1] was to be considered. We were unable to obtain any data as to costs of construction, and knowing that others might wish to construct a flume of somewhat similar dimensions and under conditions not far different, we kept an accurate account of costs, which is herewith given:

The size of the flume is 8 ft. inside width, by 4 ft. in depth. Main bents placed 16 ft. apart; 8 by 8-in. legs; center posts, 6 by 6 in. and 6 by 8 in.; caps, 6 by 8 in. and 6 by 10 in., 9 ft. long. Intermediate bents, placed half way between main bents, 6 by 6



END VIEW, SHOWING CONSTRUCTION OF BENTS.

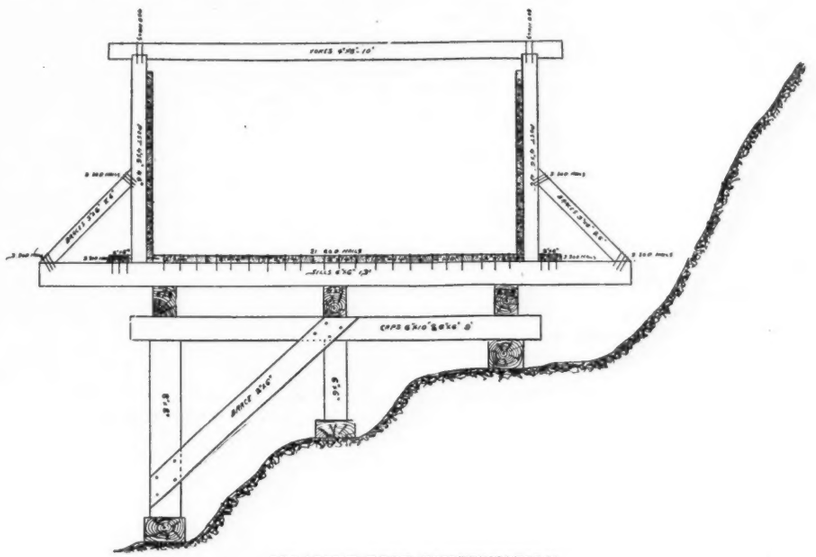
in.; legs and center posts, 6 by 6 in.; caps, 6 by 6 in., 9 ft. long. Stringers, three 6 by 8-in. stringers sized to 7½ in. Sills, placed 4 ft. apart, 6 by 6 in., and 13 ft. long. Posts, 4 by 6 in., 5 ft. long. Caps, 4 by 6 in., 10 ft. long. Angle braces, 3 by 6 in, 2



SIDE VIEW SHOWING METHOD OF CONSTRUCTION.

ft. 6 in. long. Foot braces, supporting bottom of posts, 2 by 6 in., 16 ft. long. Bottom planks, 2 by 4 in.; side planks, 1½ by 12 in.; battens, ⅝ by 6 in., all 16 ft. long. The flume was 654 boxes in length, or 10,462 ft.

Some two years previous we built 401 boxes of flume, 6,416 ft. long, and unfortunately graded the side hill so as to locate the flume on solid ground. This disturbed the natural slope of the ground and caused bad slides. No attempt was made to do any grading in the new flume construction, except to level to a spot to place the posts upon. From the drawing, given herewith, our method of one long leg and a short leg for side hill country can be seen.



STRAIGHT POST CONSTRUCTION.

Of the 654 boxes built, 102 averaged 14 ft. in height. The balance was side hill work, with an average height of 5 ft. in center.

Generally it is considered cheaper to commence at the head of your flume and build down stream, floating the lumber in the flume. We decided this was not as economical for several reasons: First, in the excessive heat which prevails in our section during the fall our lumber would have checked badly. Second, it would have required the handling of the lumber more often. Third, you would have to walk in the water or complete your flume as you went along even to the walking-board.

An idea, new to most of us, was suggested by the foreman. A low truck was made with axles wide enough to run on the two outside stringers, and with this we could run our lumber out and keep a long way ahead with our bents. We immediately laid the floor and used it as a wagon road to haul the lumber with a single horse in shafts, the wheels to the trucks being 10 in. wide, made of a cut of a tree, and with two 4 by 1½-in. tires.

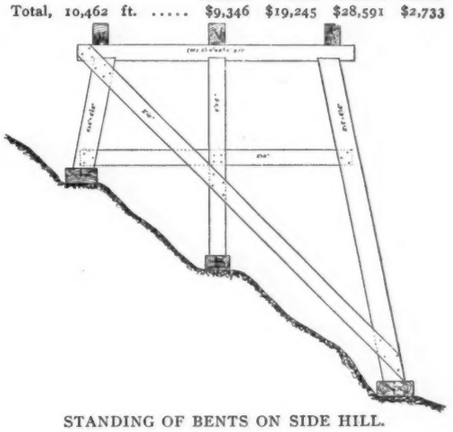
It will be seen from the list of lumber used that our sides were of 1½-in. plank. That is too light, as they should have been made of 2-in. plank. The 1½-in. plank springs away from the batten between the posts.

If any one contemplates building a large flume of this description it would pay to make a contract with the sawmill to have all the lumber cut and squared to exact lengths, except the bottom plank (on account of bends); to have the stringers sized to the proper thickness and to have all the caps gained. While this may seem an extra expense, it will be found much cheaper than having it done at your own mill on the ground.

This construction may not suit all ideas, but it has demonstrated itself now after one year's trial to be substantial and solid. To Mr. A. M. Reynolds, the engineer in charge of the work at that time (who has since died), is due the credit of the cheap and rapid construction.

The total cost of the flume is given as follows:

	Labor and supplies.	Material.	Total.	Per foot.
Dam to old dam, 6,080 ft.	$5,775	$11,039	$16,814	$2,765
High tres. to gr., 1,411 ft.	1,867	3,293	5,160	3,656
Grade to tunnel, 2,971 ft.	1,704	4,913	6,617	2,221
Total, 10,462 ft.	$9,346	$19,245	$28,591	$2,733



STANDING OF BENTS ON SIDE HILL.

The lumber used was 994,024 ft., or an average of 95 ft. lumber per linear foot of flume.

BORATE OF MANGANESE.—H. Endemann and John W. Paisley, in the *American Chemical Journal* (29-68), say that commercial borate of manganese, intended for use as a dryer for oils, is usually a very impure article. Manganese borate, formed by precipitating the chloride with borax, loses boric acid when washed. The remaining residue rapidly oxidizes in the air. To prevent oxidation an excess of borax is sometimes used and the product is not washed. Other manufacturers decolorize the washed and oxidized product by the addition of sodium sulphite or some other substance. The authors analyzed the washed precipitate obtained from manganese sulphate and borax and found 20 to 25 per cent less B_2O_3 than the formula MnB_4O_7 demands. The compound $MnB_4O_7.5H_2O$ was obtained as a rose-colored amorphous mass by adding boric acid to the washed precipitate and allowing the mixture to evaporate spontaneously. The salt loses $2H_2O$ at 120°.

* Paper read before the California Miners' Association.

[1] The miners' inch varies somewhat in different districts. A fair approximation gives as its equivalent from 2,200 to 2,300 cu. ft. of water in 24 hours.

THE BURRO MOUNTAIN TURQUOISE DISTRICT.

BY GEO. D. REID.

Since the earliest times the turquoise has been held in high esteem, both as an ornamental stone and as a gem. For centuries the finest varieties have come from a small district in Persia, and many, of poorer quality, have been exported from Egypt.

In both America and Europe, until recent years, the Persian stones have commanded the best prices in the gem markets. The last ten years have shown great changes in this respect, and to-day American stones of gem quality command as high, and often higher, prices than the best of the Persian product.

Although good turquoise is found in some half dozen localities in the United States, it is from one district alone that the bulk of the market is supplied. This locality is on the northern edge of the Burro Mountains in Grant County, New Mexico.

The presence of turquoise in this district has undoubtedly been known for centuries, and here, as in most other portions of the West and Southwest, evidences of ancient mining are plentiful. Stone hammers, polishing stones, pestles, mortars, carving on adjacent rocks, and other relics of former operations are found everywhere among the dumps and open-cuts left by Aztec or Indian workers. In numberless caves, cliff-dwellings, and other ancient habitations can be found idols, beads and other ornaments of turquoise. To some extent, this is true from Panama to Cheyenne, but it is especially true with regard to Sonora, Arizona and New Mexico.

The modern history of the Burro Mountain turquoise district can be given in a few words. One of the earliest white men in the district was John Coleman, who located several claims in the later seventies and the early eighties. Nicholas C. Rascom was also among the pioneers; these men were followed by many other miners, most of whom were local prospectors.

Many of the prospectors had not the means for developing their claims, and for some years little work was accomplished beyond the annual assessments as required by the United States mining law of 1872. Most of the stones found at this time were sold, for comparatively small sums, in the local market at Silver City and elsewhere.

In 1882 Mr. Coleman disposed of most of his ground to Messrs. Parker and Porterfield. These men afterwards formed a company known at the Occidental & Oriental Turquoise Mining Company, composed largely of local shareholders. A good deal of development was done by this company, and with some success. In 1901 all the holdings of the Occidental & Oriental Company were transferred to the Gem Turquoise and Copper Company. At this time the popular craze for matrix turquoise was just beginning to spread, and the new company is understood to have made large sums from the mining and handling of this product. The popularity of turquoise matrix has since waned, but the new company has worked continuously for over a year, and is to-day making weekly shipments of fine gem material to its New York agents.

In 1891 N. C. Rascom sold out his holdings to the Azure Mining Company, a close corporation of three shareholders. Since that time this company has worked continuously and, in the eleven years of operation, is said to have averaged fifteen men employed and to have never lost a shift. During most of these eleven years regular shipments of the rough stones have been made to New York.

The two companies just mentioned are the principal operators in the district. Other claims are held by J. Bush, representing the Silver City Turquoise Company, M. W. Porterfield, the Alessandro Copper Mining Company and others. On these claims little work has been done of late, and no gem material has been produced.

Mr. George Frederick Kunz, in his admirable work on "The Gems and Precious Stones of North America" (Edition of 1890), makes no mention of the Burro Mountains, most of the development in the district having been done since the publication of this edition. In his forthcoming report to the United States Geological Survey Mr. Kunz says: "Turquoise mining has been active during the last year. There are at least six companies engaged in working for American turquoises, and it is a question that only time can decide how much increase of output the market will stand. Thus far, however, as the multiplication of companies shows, there is no sign of over-supply; the gem is in high favor, and novel and varied forms of cutting and setting it have been lately introduced.

"Turquoise mines have now been found in at least five States and Territories—Arizona, New Mexico, California, Nevada and Colorado."

With regard to New Mexican turquoises, Mr. Kunz says: "According to the published report of Governor Otero there are some 60 or 70 turquoise claims, of which 10 or 12 are being worked with profit. Six important companies, as above stated, are actively at work, and are furnishing the bulk of the world's supply. . . .

"During the Southwestern tour of President McKinley four beautiful turquoises from the Porterfield mines in the Burro Mountains were presented to him by Governor Otero. The largest stone was a superb specimen of 20 carats weight."

Turquoise is occasionally liable to fade. Some of the companies claim that their stones never change or lose color; if so, indeed, it is a remarkable fact in the case of a mineral so long regarded as unstable in this respect. Several of the companies give a guaranty that if one of their stones changes color within six months after its purchase from a retail jeweler, they will replace it with a new one. This is a great improvement on the old method of the Persian dealers, who were wont to decamp for parts unknown as soon as their turquoises were sold. In order to protect themselves against false claims the several companies have adopted the system of marking each of their stones by cutting a trademark on the back, an A for the American Turquoise Company, a circle for the Azure Company, a cross for the American Turquoise & Copper Company, a T for the Toltec, an arrow for the Himalaya, etc.

With regard to the geology of the Burro Mountain turquoise field, the country rock is a granite, and this is undoubtedly the case in the best producing area; partial metasomatic action is shown throughout the whole formation and towards the outer edges of the district, especially towards the south and the southeast, the feldspars have been extensively kaolinized. This granite appears to be of later origin than that of the Burro Mountain copper-bearing formation, into which it apparently intrudes.

Turquoise is essentially a hydrated phosphate of alumina, but it is rarely found in the pure state. It is, in fact, to impurities that its commercial value as a gem stone is due. The beautiful azure color of the best stones is caused by the presence of small quantities of copper. In this district turquoise occurs chiefly in small seams or veinlets or as nodules in the country rock. In most cases the nodules give the best color, hardness and purity, and are the most valued as gem material.

From an economical standpoint the conditions for cheap mining are exceptionally good. Labor, fuel and water in sufficient quantity are all cheaply and easily obtained, and the fact that most of the mining is done by open cuts and channeling, and that the output of the mines costs practically nothing for shipment, or for treatment after sorting, until it reaches the lapidaries at New York, makes turquoise digging one of the simplest kinds of mining.

At present the gem material brings from $5 to $10 per carat at retail, a large and exceptional stone of say, 20 carats being valued at a higher rate. Most of the claims in this district have been long since taken up and worked, and there is to-day little chance for the investor to purchase turquoise ground unless it be on the outlying edges of the district.

IRON MAKING IN SCOTLAND.—At the close of April there were 87 blast furnaces at work in Scotland, of which 38 were running on foundry iron, and 49 on bessemer and basic iron. Trade is not very active, and six furnaces were blown out in the last week of the month.

LAKE SUPERIOR IRON ORES.

Figures gathered from the various Lake Erie dock managers by the *Marine Review, of* Cleveland, O., are given below, showing that on May 1, deducting new ore brought down in April, the stocks of iron ore at Lake Erie ports were 3,592,367 tons. This is to be compared with 2,848,194 tons on May 1, 1902, 3,050,183 tons on May 1, 1901, and 1,720,656 tons on May 1, 1900. The amount of ore put on merchant docks in April this year, of which no account is taken in the above figures, was 85,785 tons. Much of the ore that came down in April went to furnaces direct, or was taken over the docks of consumers—like the American Steel and Wire Company, at Cleveland, the Lorain Steel Company at Lorain, or the Buffalo Furnace Company, at Buffalo. The following table shows the stocks on docks on May 1, 1902 and 1903, by ports, with the amount on the same docks on December 1, in the same years:

	Dec. 1.		May 1.	
	1901.	1902.	1902.	1903.
Toledo	254,196	310,023	111,511	126,331
Sandusky	47,384	95,175	37,400	56,500
Huron	231,501	232,764	129,635	147,817
Lorain	195,863	328,304	96,992	190,311
Cleveland	1,378,060	1,500,604	624,865	829,347
Fairport	710,590	924,236	472,325	555,709
Ashtabula	1,769,145	1,967,136	924,742	1,073,967
Conneaut	604,106	673,679	152,891	125,400
Erie	470,718	722,966	223,972	426,744
Buffalo	198,100	319,367	73,861	60,241
Total	5,859,663	7,074,254	2,848,194	3,592,367

The total shipments to furnaces through Lake Erie ports for the season-year ending May 1 are shown in the following table:

	1901-02.	1902-03.	Changes.
Stock on docks, Dec. 1	5,859,663	7,074,254	I. 1,214,591
Stock on docks, May 1	2,848,194	3,592,367	I. 744,173
Winter shipments	3,011,469	3,481,887	I. 470,418
Sum'r ship., May 1-Dec. 1	14,203,596	18,423,364	I. 4,219,768
Total deliveries	17,215,065	21,905,251	I. 4,690,186

The summer shipments include the consumption by furnaces at Tonawanda, Buffalo, Cleveland and Lorain, receiving ore direct into their own yards. The totals given above compare further with 14,468,260 tons in the 12 months ending May 1, 1901, and 15,574,785 tons for the 12 months ending May 1, 1900.

The amount of ore on dock this spring, as shown by the above figures, is somewhat less than was expected, preliminary estimates having put it at about 4,000,000 tons. As compared with the consumption this is a smaller percentage of the total than the average of the past half dozen years. The time was, not long ago, when 1,500,000 to 2,000,000 tons on docks at the opening of navigation constituted an effectual damper on the trade.

CALCIUM AND STRONTIUM.—Drs. Borchers and Stockem write in *Zeitschrift fur Elektrochemie* (8-757) on the electrolytic production of calcium and strontium. In their method, as described by H. N. McCoy in the *Journal* of the American Chemical Society, the electrolytic cell is made of a cylinder of carbon, which serves as the anode. It has a bottom of insulating material. The bottom is hollow and is cooled by flowing water. An iron rod, which passes through the bottom of the cell forms the cathode. To make metallic calcium, a layer of powdered fluorspar is first placed in the cell and on top of this, calcium chloride. The fusion of the latter salt is started by means of small, electrically heated rods of carbon which are temporarily so placed in the cell as to make electrical connection between the anode and cathode. The fluorspar remains solid. The metallic deposit on the cathode contains much calcium chloride, which may be removed, to a large extent, by squeezing while still hot. This product contains 90 per cent of calcium. It may be fused to a silvery mass. Metallic calcium can be produced for 90c. per kilogram. Strontium can be made similarly.

ACCIDENTS IN KENTUCKY COAL MINES.

We are indebted to Mr. C. J. Norwood, State Mine Inspector, for a statement of the fatal accidents occurring in the coal mines of Kentucky during the year 1902. The total quantity of coal mined in the commercial, or shipping, mines of the State was 6,429,419 short tons. The total number of employees was 12,036, of whom 9,867 were inside, or underground; while 2,169 were outside, or surface workers. The number of fatal accidents for the year was as follows:

	Number.	Per 1,000 employed.
Killed inside mines	17	1.723
Killed on surface	1	0.461
Total	18	1.495
Tons coal mined per man killed inside		378,201
Tons coal mined per man killed inside and out		357,190

Of the deaths inside the mines, 11 were caused by falls of top; 1 by falls of side; 1 by premature blast; 1 by a blow from a trap door; while 3 were caused by asphyxiation of men returning too soon on powder smoke. The single outside accident was caused by a riding trip. Thus 67 per cent of the deaths were caused by falls of coal or rock.

BOLIVIAN TIN.

Our attention has been called by Messrs. H. A. Watson & Co., of Liverpool, to a recent statement in the JOURNAL that the "Bolivian tin ores are sent to Tostedt, Germany, to be smelted." This statement should have been qualified by the words "some of," as only a small part of those ores go to Germany, the larger part being taken by British works.

A part of the Bolivian tin reaches Europe in bars, but the greater part is in the form of *barilla*, usually classed as ore in the customs returns. The receipts in Great Britain in 1902, according to the circular of Messrs. H. A. Watson & Co., included 1,685 tons bars and 10,961 tons barilla (or ore), the latter equal to 6,576 tons fine tin; making a total of 8,261 tons tin. A comparative statement for two years shows receipts, etc., as follows, in long tons of fine tin:

	1901.	1902.	Changes.
Stocks, Jan. 1	846	184	D. 662
Arrivals	7,635	8,261	I. 626
Total	8,481	8,445	D. 36
Consumption	7,284	8,923	I. 1,639

For the year 1902 the receipts at Hamburg were 1,790 tons barilla, equal to 1,074 tons fine tin. The total quantity taken by German smelters, including that purchased in England, was somewhat less than 3,000 tons barilla. Only part of this went to the Tostedt works, other smelters in Germany taking some of it.

The Hamburg receipts, added to those given in the table, make the total receipts of Bolivian tin in Europe last year 12,751 tons barilla and 1,685 tons bars, the whole being equal to 9,335 tons of tin.

LAKE SUPERIOR TRAFFIC.—Reports from canal officials at the Sault Ste. Marie give details of commerce to and from Lake Superior in April. Briefly stated the commerce of both canals, Canadian and United States, is 1,651,839 tons (net tons in all cases) to May 1 of this year, compared with 2,339,234 tons to May 1, 1902, or a decrease of 687,395 tons. The decrease is, of course, due to the later opening of navigation this year. In April, 1901, there was practically no traffic in the canals—only 3,545 tons. The items of mineral freight included are as follows, in net tons:

	1902.	1903.	Changes.
Anthracite	44,228	159,304	I. 115,076
Bituminous	303,030	445,344	I. 142,314
Total coal	347,258	604,648	I. 257,390
Iron ore	1,492,051	698,437	D. 793,614
Pigs and man. iron	4,162	3,271	D. 891
Copper	4,469	6,311	I. 1,842
Salt, bbl.	42,365	21,369	D. 20,996

Of the total freight this year 1,073,520 tons were east-bound and 638,319 tons west-bound freight.

AMERICAN LOCOMOTIVES FOR PERU.—There is considerable talk in the English papers because the Peruvian Corporation has placed an order for some new locomotives needed for its lines in Peru with the Rogers Locomotive Works, at Paterson, N. J. Most of the locomotives in use on the road are of American manufacture.

ABSTRACTS OF OFFICIAL REPORTS.

Shelby Iron Company, Alabama.

This company's report covers the year ending March 31, 1903. It shows net operating income of $251,210, miscellaneous expenses of $1,123, and net income of $250,087. The sum of $12,186 was written off for depreciation, leaving a balance of $237,901. To this must be added the surplus of $132,386 carried over from April 1, 1902, making a total balance of $370,287. After allowing for two dividends, which called for a disbursement of $159,874, there was a surplus of $210,413. During the year there was charged for stumpage for wood taken from the company's land $3,507, and for wood taken from timber rights $4,976, making a total of $8,483, which entered into the cost of charcoal. During the year 25c. per ton of iron made was charged into the cost of iron for extraordinary or prospective repairs. This account showed at the close of the fiscal year a credit of $9,556. Out of this will be charged the extraordinary repairs in relining No. 1 furnace, which was not completed before the end of the fiscal year.

The company owns two charcoal furnaces at Shelby, which make a high grade of iron. The pig iron output for the year was 37,222 tons. Commenting on the operations of the year President Bush says:

"Furnace No. 1 was in operation during the fiscal year with the exception of the month of March, when it was blown out for relining. The work on this furnace has been completed, with decided improvements over what it was heretofore. I think its capacity and efficiency have been improved, and I regard it in its present condition probably the best charcoal furnace in the South. Furnace No. 2 was blown out for repairs December 4, 1901. It was not blown in until the first week of May, 1902. It has been in continuous operation since that time, and is now showing a material increase in output over its previous results.

"As is well known, the iron market generally was active in the fiscal year, prices reaching a maximum beyond the expectations of any one. The prices which at one time seemed reasonable and fair, and at which we sold a large percentage of our output, later appeared comparatively low; although taking the year as a whole, we secured fairly good average prices. The market for iron future delivery, covering the first and second half of the present calendar year, has been good, so that we have been able to sell at good prices a large percentage of our prospective output for the remainder of the year 1903. We expect from the condition of our furnaces that our output for the present fiscal year will be increased, and, therefore, we will probably have an additional quantity of iron to offer over and above the sales already made.

"During the year just closed, two dividends were paid, one 6 per cent and one 10 per cent, in the months of April and November, 1902. A further dividend has been declared, payable May 15, 1903."

Arizona Copper Company, Limited.

The report of this company covers the year ending September 30, 1902. The accounts, as stated in sterling from the office in Edinburgh, Scotland, show net profits from mines of £183,225; railroad, £113,662; total, £296,887. Payments were, for mine administration, £13,888; railroad administration, £8,306; Edinburgh office, £2,506; interest, etc., £25,718; reserve, £40,000; dividend on preference shares, £24,531; total, £114,949, leaving a net balance of £181,938. The directors' report says:

"The balance brought forward from 1901 was £14,410, which, added to the above surplus of £181,938, gives a total surplus of £196,348. Out of this surplus the directors recommend that dividends on the preferred ordinary and deferred ordinary shares be declared for the year of 9s. 6d. per share, free of tax, absorbing £180,488, and that the balance of £15,860 be carried forward.

"As will be seen, there has been deducted from the profits of the year a sum of £40,000, which has been carried to reserve to provide for redemption of debt and contingencies. The capital expenditure during the year, including the outlay on the construction of the Lordsburg & Hachita Railroad, has amounted to £164,092. This expenditure has to a large extent been provided for by the sum received from the sale of certain of the company's mines referred to in previous reports. During the past few years the capital expenditure has been exceptionally heavy, but the results have amply justified the outlay. For the two years to 1900 and 1901 the copper production was 9,258 tons, and 9,949 tons (2,000 lb. each), respectively; for the year 1902 it was 15,000 tons. Not only has the quantity produced thus been increased by about one-half, but the cost of production has been materially reduced.

"The construction of the Lordsburg & Hachita Railroad has been completed, and the line is now in successful operation. It has been leased to the Arizona & New Mexico Railway Company, and will be worked by that company as part of its system. The contracts at the old freight rates having now expired, the direct railroad profits will not in the future be so large as the average of the past few years, but it is anticipated that this will be compensated for by the saving in freight rates and other reductions in cost which will accrue to the Copper Company."

The report of General Manager Colquhoun, which covers the half-year ending September 30, says: "In the smelting department 54,489 tons of copper ore and concentrates, and 1,635,269 lb. copper derived from leacher, were smelted, resulting in a gross yield of 15,049,065 lb. (not including 62,930 lb. copper produced as bluestone), which was equal to a monthly average of 1,254 tons. Of this, 6,707 tons were obtained from the smelting of copper ores and concentrates, representing an average yield of 12.3 per cent.

"In the mill, 195,849 tons of concentrating ores were treated, and, in their concentration, yielded 28,806 tons of concentrates. Of the 195,849 tons of ore treated, 66,137, or 33.8 per cent, were obtained from Metcalf and Brunswick, and 129,712 tons, or 66.21 per cent, from the Humboldt Tunnel workings and from Yavapai. Nos. 1, 3 and 4 concentrators treated 101,366 tons, and No. 5, 53,103 tons of sulphide ores, while No. 2 concentrator disposed of 41,380 tons of oxide ores, which was obtained from Metcalf and mines tributary to that field. On an average, 6.8 tons of raw ore produced 1 ton of concentrates.

"The operation of the acid plant resulted in a yield of 2,257.6 tons of sulphuric acid (H_2SO_4). During the previous half-year the output of acid was 2,239.5 tons.

"The leaching plant treated 35,721 tons of tailings, and produced 1,532,061 lb. copper. In addition, it produced 125.86 tons of bluestone, which contained 31.47 tons of copper. The yield per cent (including copper contained in bluestone) was 2.23, as against 2.49 for the last term, when 35,035 tons of tailings were treated. Not having been able to obtain a steady market for our bluestone, we have in the meantime suspended its manufacture.

"Including fluxes, 232,271 tons of ore were treated, the yield being equal to 3.23 per cent. In the previous term the tonnage amounted to 215,556, and the yield to 3.49 per cent. In all, 221,386 tons of copper ores were treated, of which 195,849 tons, or 88.5 per cent, were concentrating ores. The average yield of all copper ores treated was 3.37 per cent. Including bluestone, the yield was 3.39 per cent. First-class ores yielded 2,130 tons of copper, while the concentrating ores, including the leacher output, contributed 5,374 tons, including copper in bluestone. The yield from concentrating ores was 2.76 per cent, as against 2.95 per cent last half-year. . . .

"The results for the half-year again show a substantial reduction in the cost of copper, and this notwithstanding the fact that the yield of the ore has

fallen to 3.4 per cent. The drop in grade is in part due to the reduced output of first-class ores, a reduction which is likely to obtain for some time to come, and in part to the slightly leaner quality of the concentrating ores. The reduction in railroad rates, which entered into effect September 1, 1902, made but little difference in the cost on account of the stocks held on September 1, all of which had accumulated under the former rates. The real effect of the reductions, therefore, only become visible after September 30, 1902.

"Improvements made on No. 1 concentrator resulted in a large increase in capacity and in a sensible decrease in cost. No. 5 concentrator also showed a decided increase in capacity. It is now being operated by gas engines, which are working very economically.

"The Coronado Railroad's business was largely increased, and this, together with cheaper cost of operating, resulted in a decided improvement. The widening of the upper section of the Coronado Railroad, extending from the Longfellow to the Shannon bins above Metcalf, was not completed on September 30. It was, however, completed during the first week of November, since which time the railroad has been operated with diminished costs.

"The smelting plant has improved even on the last reported results. The improvements on the bessemer plant have not all been completed, but they have been so far advanced as to improve the capacity of the plant, which is now more than equal to our needs. The improvements on the Longfellow incline will be completed in December. The new round house at Clifton has been completed; and the new machine shop is in course of erection.

"During the half-year, 7,504 tons of copper were produced; adding to this the output of the previous half-year, we have a gross output of 15,014 tons for the year.

"The mines tributary to the Humboldt Mountain cover probably not less than 75 per cent of the known mineral wealth of the company. Such being the case, their safety, the methods of mining, and the systems of tramming are matters of supreme importance. The new system of attack, decided upon a year or so ago, has only been partially applied. It is a very big job, involving much sinking, drifting and upraising, and it may take a year or even more to carry us fairly into it. Its value, however, is becoming more and more apparent. On account of this and other work, but little in the way of development work was done during the past year. When I say little, I speak in a comparative sense. We have done much, but our ore output, amounting to 1,200 tons per day, more or less, is a very large output, and large outputs call for large developments. I expect, therefore, to expend more money in development work during the next year. These developments may and ought to lead us into ground which will yield a larger proportion of high-grade ore, which is highly desirable.

"Apart from the slight reduction in grade, the mines are in first-class shape, and the quantity blocked out and placed in sight leaves no room for uneasiness as to the future. Our position in that respect is very strong, so strong that it more than justifies us in all we have done in the way of improvement. Outside of our principal ore-bodies there are very large bodies of ore which are too low in grade to be worked under the present cost of mining, and at the present price of copper. I am inclined to think that in time our mining methods will improve sufficiently to enable us to treat such ores with profit. At Metcalf conditions exist which, I believe, call for the application of power and machinery; these subjects are receiving attention. The Queen Group of mines, which have been neglected for many years, will, I expect, before the end of the next year, become a steady ore contributor. It has in sight large surface exposures of concentrating and leaching ores which can now be treated to profit.

"The improvements on the railroads and metallurgical works are practically completed. Such being the case, we are now in a position to devote more thought and time to improvements at the mines. These, of course, would be at most of a minor character, but a very small improvement might well cause a considerable reduction in the cost of mining and of handling our ores."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Un Modelo para Espana—Cartas Alemanas. By Sr. Julio de Lazartegui. Bilbao, Spain; published by the *Revista Bilbao.* Pages, 352.

Modern Machine Shop Tools. By William H. Vandervoort. New York; Norman W. Henley & Co. Pages, 552; with 672 illustrations. Price, $4.

Censo y Division Territorial del Estado de Zacatecas, Mexico. Verificado en 1900. Mexico; Printing Office of the Secretaria de Fomento. Pages, 240.

Bureau of Mines of Ontario. Bulletin No. 9. Peat-fuel; its Manufacture and Use. By W. E. H. Carter. Toronto, Ont.; Public Printer. Pages, 48; illustrated.

Biennial Report of the State Geologist of Missouri. 1901-1902. Ernest Robertson Buckley, State Geologist. Jefferson City, Mo.; State Printers. Pages, 88; illustrated.

Geological Survey of Georgia. Bulletin No. 9. A Preliminary Report on the Granites and Gneisses og Georgia. By Thomas L. Watson. Atlanta, Ga.; State Printer. Pages, 368; illustrated.

Das Roheisen unter Mitberucksichtigung seiner Weiteren Verarbeitung. Part I. Prepared in the Ministry of Trade of Austria-Hungary. Vienna, Austria; published for the Ministry. Pages, 280.

Anuario Estadistico de la Republica Mexicana. Prepared by the General Statistical Office, under the direction of Dr. Antonio Penafiel. Mexico; Printing Office of the Secretaria del Fomento. Pages, 580.

Special Consular Reports; Volume XXVI. Briquettes as Fuel in Foreign Countries. Prepared in the Bureau of Foreign Commerce, Department of State. Washington; Government Printing Office. Pages, 156; illustrated.

Sixteenth Annual Report of the Interstate Commerce Commission. Martin A. Knapp, Judson C. Clements, James D. Yeomans, Charles A. Prouty, Joseph W. Fifer, Commissioners; Edward A. Moseley, Secretary. Washington; Government Printing Office. Pages, 352.

Quantitative Chemical Analysis by Electrolysis. By Dr. Alexander Classen. Translated from the German, Revised and Enlarged, by Bertram B. Boltwood. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 324; illustrated. Price, $3.

BOOKS REVIEWED.

California Miners' Association Annual, 1902. Edited by Edward H. Benjamin, Secretary. San Francisco; Published by the Association. Pages, 172; illustrated.

This volume contains the proceedings of the California Miners' Association, at its annual meeting held in San Francisco, in November last. In addition to the committee reports and discussions of the Association, there are a number of papers presented by members, all of which are of much interest. Mr. Herbert Lang writes on "Late Improvements in Copper Smelting"; Mr. Thomas J. Barbour on "Recent Improvements in Mining Dredges"; Mr. W. C. Ralston on "Flume Construction"; Mr. von der Ropp on the "Use of Crude Oil in Smelting"; and Prof. Christy on "Improvements in Concentration and Ore Dressing." There are also a number of brief addresses on various interesting points in mining, while the discussions contain some records of experience which are worth preserving. The reports of the Law Committee and of the Committee on Mineral Lands possess especial value.

Annual Report of the State Geologist of New Jersey, 1902. Henry B. Kummel, State Geologist. Trenton, N. J.; State Printer. Pages, 156; with map and illustrations.

This report summarizes the work of the New Jersey Survey for the year 1902. This included, besides a continuation of the topographic work of the Survey, an especial examination of the current work in the iron and copper mines of the State. Preparations were also made for further work on the surface geology of the southern part of New Jersey, and for a systematic report on the "Economic and Technical Phrases of the Clay Industry," which is expected to be of much importance, in view of the extensive use made of the clays in the State. The Survey now has under its charge the Forestry work, and much is being done in preparing systematic plans for preventing fire damage, and for giving advice to forest-owners as to planting and care of their lands. In addition to the administrative report, the volume contains three special reports. The first relates to the floods of February and March, 1902, and to the probable effect of the proposed drainage works in the Passaic Basin. This is written by Mr. C. C. Vermuele. Mr. Lewis Woolman contributes a report on Artesian Wells, dealing chiefly with those in South Jersey. Mr. Kummel has a brief report on the Iron and Zinc Mines of the State, and Mr. Walter Harvey Weed a somewhat longer one on the Copper Deposits. Under the Forestry heading, Mr. F. R. Meier has a paper on Forest Fires, with special reference to those occurring during the year covered by the report.

United States Geological Survey. Contributions to Economic Geology, 1902. S. F. Emmons, C. W. Hayes, Geologists in Charge. Washington; Government Printing Office. Pages, 450.

This is a bulletin of 450 pages published by the United States Geological Survey, containing 61 contributions from 33 members of the Survey, who have been engaged in economic work more or less contiuously throughout the past year. It has been prepared under the care of Messrs. S. F. Emmons and C. W. Hayes. It includes three classes of papers: (1) Preliminary discussions of the results of extended economic investigations, which will later be published by the Survey in more detailed form; (2) comparatively detailed descriptions of occurrences of economic interest, noted by geologists of the Survey in the course of their field work, but not of sufficient importance to necessitate a later and more extended description; (3) abstracts of certain economic papers which have appeared in Survey publications during the last year, chiefly such as give a general account of the distribution and mode of occurrence of particular mineral deposits throughout the United States.

The papers have been grouped according to the subjects treated. At the end of each section is given a list of previous publications on that subject by this Survey. These lists will be found serviceable by those who wish to ascertain what has been accomplished by the Survey in the investigation of any particular group of mineral products. They are generally confined to Survey publications, though a few titles of important papers published elsewhere by members of the Survey are inclined.

Abstracts of several of the important papers have already been published in this JOURNAL, and among these may be mentioned Mr. Weed's report on the Butte District, Mr. Lindgren's on the Clifton Copper Deposits, Mr. Ransome's report on Bisbee, Mr. Eckel's on the Dahlonega District and Mr. Spurr's preliminary account of Tonopah. These are but examples of a much larger number of good things contained in this convenient volume. We may mention,

for the sake of our Western readers, that the *Bulletin* contains Mr. Boutwell's progress report on the Park City District; Stream Tin in Alaska, by Mr. Brooks; the Copper Deposits of Binghak, by Mr. Boutwell; those of Redding, Cal., by Mr. Diller; the report on the Grand Encampment District, by Mr. Spencer, and several valuable papers on petroleum by Mr. Eldridge.

The gentlemen of the Survey are to be congratulated on the prompt publication of this timely volume and Messrs. Emmons and Hayes particularly are deserving of the gratitude of the mining public for rendering so much valuable material generally available to those engaged in actual mining operations in the districts described.

Notes on Metallurgical Analysis. By Nathaniel Wright Lord. Second Edition, 1903. Columbus, Ohio; Published for the Author. Pages, 228; illustrated. Price, $2.50.

The first edition of this book, which was published nearly ten years ago, was written for the use of the Author's students in the Ohio State University, and the object was to give, in a condensed form, a series of selected methods in metallurgical analysis. The book has been extensively used, and its methods generally approved. Time not only made some changes necessary, but also suggested some extension of the scope of the work in order to make it available for the use of chemists employed in metallurgical laboratories, as well as for students in technical schools. With this object the book has been rewritten and greatly enlarged. It now includes methods for the determination of all elements likely to be encountered in the ordinary work of a metallurgical laboratory. Thus we find methods for the analysis of iron ores and of limestones, for determinations of iron, phosphorus, silicon, manganese, sulphur, carbon and titanium. The separate determinations of nickel, tungsten, chromium and other elements in steel, are also treated at considerable length. Much space is given to the analysis of coal and coke and to gas analysis, while there are also chapters on blast-furnace slags, fireclay, and on the examination of water. Final chapters are given on the determination of copper, the assay of zinc ores and the analysis of a considerable number of the ordinary alloys.

Experience with the first edition has shown the worth of this book, and the rewriting and enlargement in the new edition have added very largely to its value. It will be found a very useful manual, both for students and for chemists in actual practice. The illustrations are generally good, showing the different forms of apparatus used, and the methods of applying them in the chemist's work.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

TUNGSTEN ORE FREE OF DUTY.—Hempstead & Son entered importations of tungsten ore at Philadelphia, which the collector assessed for duty at 20 per cent ad valorem, under paragraph 183 of the tariff act. Counsel for the importers argued that the ore should be classified under paragraph 614, which admits free of duty "minerals, crude, or not advanced in value or condition by refining or grinding, or by other process of manufacture, not specially provided for in this act."

On appeal from the Collector's decision, the Board of General Appraisers supported his interpretation of the act, and held the ore subject to duty. An appeal was taken to the Circuit Court, and this decision was again sustained. The importers then took a final appeal to the United States Circuit Court of Appeals. The last court rendered a decision on May 7, reversing that of the lower court and holding that tungsten ore is entitled to free entry, under the clause of the act cited by appellants. —Appeal of O. G. Hempstead & Son; United States Circuit Court of Appeals.

USES FOR WHICH TIMBER MAY BE TAKEN FROM MINERAL LANDS.—The law of the United States (act June 3, 1878, *Compiled Statutes*, 1901, page 1528) permits the taking of timber from the public lands for mineral purposes, under such regulations as the Secretary of the Interior may prescribe. It was held that while the Secretary might prescribe regulations concerning the removal of timber, and that his interpretation of the intent of the act is entitled to weight, he has no power to enlarge or restrict the purpose for which timber may be used. The removal of timber by a mine owner for the purpose of roasting ores at the mine; a process whereby the ores are not fused but the volatile substances are driven off in vapor, gases, etc., whereby the ores are more readily smelted afterwards, is a taking of such timber for mining purposes, within the meaning of such act.—United States v. United Verde Copper Company (71 *Pacific Reporter*, 954); Supreme Court of Arizona.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

A Simple Blue-print Machine.

Sir.—I observe in your issue of May 9, page 708, Mr. Binkley's illustrated description of a device for making blue-prints of large sizes without the use of glass or a printing frame.

I think that device was the invention of Prof. Edwin S. Cleaves. The first published account of which I have knowledge was presented by me to the American Society of Mechanical Engineers in 1888, and will be found in the *Transactions* of that society, Vol. 9, p. 696. A copy of a large blue-print made by this process was exhibited by me to the Society at an earlier meeting, and a reference to this method and its work will be found in the *Transactions* of the American Society of Mechanical Engineers, Vol. 8, p. 722, which was, I think, the first announcement made of its use. One of these blue-prints was also exhibited at the Kaaterskill meeting of the Civil Engineers. These prints were 8 ft. long. That accompanying the first mentioned paper was 14 ft. in length, and a device of my own, modifying Prof. Cleave's arrangement, was used in its production. This last was simply a long board of proper dimensions, upon which the blue-print paper and the tracing were stretched, and the board then sprung slightly to make close contact. Drawings are shown at p. 698 of the first reference above.

By using a pair of cylinders, off which a roll of tracing cloth may be passed to a second cylinder used as the printing cylinder, almost any length can be obtained. This arrangement was used at the Altoona shops of the Pennsylvania Railroad in making prints 75 or 100 ft. long. This arrangement is described in the discussion of the paper presented at the Nashville meeting of the American Society of Mechanical Engineers, May, 1888. The device has been in use in Sibley College something over 15 years.

R. H. THURSTON,
Director Sibley College, Cornell University.
Ithaca, N. Y., May 13, 1903.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Stamp-mill Improvements.—What is the latest improvement in gold stamp-mills? Some time ago I saw a notice of a mill discharging on four sides. Can you give me any information regarding it?—J. B.

Answer.—So many small improvements are constantly being made in stamp-mills, that it is difficult to say what is the last. With regard to the discharge, we do not know exactly to what you refer. There are many different forms of mortars for stamp-mills with different systems of discharging. Your best plan is to write to the leading manufacturers, whose names you can obtain from our advertising columns, and procure copies of their catalogues, which will give you an idea of the improvements made by different makers.

Platinum Refining.—Can you furnish me with the names and addresses of the refiners in England and Germany, who purchase platinum minerals from the Ural in Russia?—P.

Answer.—The leading English refiners of platinum are Johnson, Mathey & Co., of London. The principal refinery at Hanau, in Germany, is that of Heraeus & Co. In addition to these two, the firm of Desmontes, Lemaire & Cie., of Paris, refine a considerable quantity. In Russia itself there are two refineries, both in St. Petersburg; one owned by Kolbe & Lindfors, the other by the Tentelef Chemical Works.

Monazite.—Will you kindly advise me, through your columns, of the sources of thorium and of monazite sand in the United States?—M. B.

Answer.—The greater part of the output of monazite sand in the United States comes from Burke and Cleveland counties in North Carolina; small quantities are also obtained from McDowell and Rutherford counties in the same State, and from some placer workings in the northwestern section of South Carolina. The production in 1901 was 748,736 lb.; for 1902 the exact figures are not yet accessible, but will not differ greatly from those for the previous year. Formerly a considerable quantity was imported from Brazil; but a concession for working the deposits there was granted to a German syndicate in 1902, and almost all of the Brazilian product now goes to Europe.

Liquid Chlorine.—Will you give me what information you can as to liquid chlorine; how much is used and by whom? Where does it come from?—T. H.

Answer.—The liquid chlorine used in the United States is imported from Germany. The demand is small, as the Western chlorination mills usually generate their chlorine from bleaching powder which makes a "water chlorine." Water chlorine sells in the East at 10c. per lb., while liquid chlorine imported is quoted at 30c. per lb. Prime bleaching powder, used for making water chlorine, sells at $1 to $1.20 per 100 lbs. in New York. A short time ago the United States Reduction and Refining Company—the Colorado mill combination—announced that it would build a liquid chlorine plant at Colorado City, Colo., to supply its mills. Importers of German liquid chlorine are Kuttroff, Pickhardt & Co., 128 Duane Street, New York City. As to the prospects for the use of liquid chlorine, the present low price of bleaching powder—the lowest in years—owing to competition between the manufacturers using the old process and those employing electricity, make them rather discouraging.

Sulphur on the Pacific Coast.—In your number of April 25 (page 652) under your heading "Pyrites" you state that the invoice value in March of pyrites imported was $8.85 per ton. Further you quote Spanish pyrites per unit lump at 12 and 13 cents per unit, 50 per cent thus giving $6 or $6.50.

It would be very interesting to us to learn something of the particulars of the iron pyrites property in Oaklands, Cal., as to its extent and quality. Also the consumption of brimstone and pyrites in San Francisco and other Pacific Coast points.—B. C.

Answer.—The invoice value of pyrites given in the JOURNAL for April 25 relates to British imports and

not to those made by the United States. The custom abroad is to include the value of by-products when reporting imports. In the United States only the sulphur content is valued.

The consumption of sulphur in California is increasing, though it is still small when compared with the Eastern demand. Heretofore California has imported from 10,000 to 15,000 tons Japanese sulphur annually, which with the local production of pyrites (about 4,500 tons) was sufficient to meet the demand. Efforts are being made to increase the production of pyrites, and the probability is that mining will be active. In other Pacific Coast States the consumption of sulphur is not large.

The Oakland mine, to which you refer, is not a large producer, and very little is being done in connection with it.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending May 12, 1903.

727,609. APPARATUS FOR STORAGE OF GASES.—Edmond Fouché, Paris, France, assignor to E. Cornelius Benedict, John S. Seymour, and Eugene Bournonville, New York, N. Y. An apparatus for storing gas consisting of a receptacle filled with a porous substance, such porous substance being saturated with a solvent of the gas to be stored.

727,626. PROCESS OF CHLORINATING AND BROMINATING ORES.—John D. Hawkins and Herbert W. Fox, Colorado Springs, Colo. A process of treating ores with a halogen, which consists in bringing a halogen hydrate into proximity to the ore and raising the temperature of said hydrate to a point sufficient to cause its decomposition with evolution of the halogen.

727,632. GRAVEL OR SAND DREDGE.—Rezin Hosford, Lebanon, Ind. The combination of two suitable frames, a driving-wheel mounted on one, an idle wheel mounted on the other, and a dredge and conveyor structure composed of open links mounted thereon, having inclined cross members whereby they are enabled to act as buckets in the dredging and conveying operation.

727,642. MACHINE FOR COMPRESSING TUBES.—Robert Kuhn, Cincinnati, Ohio. In a device for reducing tubes by compression, the combination of a mandrel adapted to be inserted into the tube to be reduced, a set of compression-rolls having complementary grooves between which the tubes are received and which are so shaped that the rolls act operatively upon a tube for a part only of their circumference, the action consisting of compressing the tube against the mandrel and simultaneously advancing both, means to arrest further progress of the mandrel after compression of the tube, a stripping device, mechanism to advance the latter with the attached tube still farther and in addition to and independently of the rolls after advancement by these latter ceases whereby the compressed part of the tube is loosened from the mandrel, and means to return respectively mandrel and the uncompressed part of the tube to proper position for operation.

727,646. BRICK-MOLDING MACHINE.—William J. Leary, Buffalo, N. Y. The combination with a mold, of a feed-receptacle, a gate which closes the discharge-opening of said receptacle, a rotary feed device for feeding the plastic material toward said gate, means for moving said gate to uncover said discharge-opening and permit the discharge of the material, and means for projecting said feed device toward the gate to move the material between said feed device and said gate.

727,650. PROCESS OF PRODUCING LOW TEMPERATURES, THE LIQUEFACTION OF GASES AND THE SEPARATION OF THE CONSTITUENTS OF GASEOUS MIXTURES.—Carl Linde, Munich, Germany, assignor of one-third to Charles F. Brush, Cleveland, Ohio. A process of refrigerating air or other gas consisting in compressing the gas, cooling it, expanding it through a suitable valve directly into a space maintained at a lower pressure, and causing the expanded cold gas to absorb heat to its full capacity from compressed gas about to be expanded.

727,656. EXCAVATOR.—William E. Maloney and Peter J. Maloney, Worcester, Mass. In an excavator or power-shovel, the combination of a bucket-swinging carriage, a rope for operating the carriage, and bucket-tipping connections also operated by said rope.

727,659. METHOD OF EXTRACTING NOBLE METALS. Frederick W. Martino, Sheffield, England. A process of recovering the noble metals from solutions thereof, which consists in treating such solutions with barium-sulphocarbide.

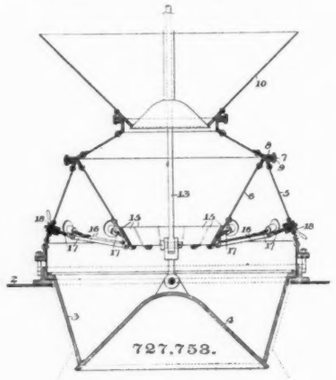
727,669. MEANS FOR HANDLING PUDDLED IRON.—Malcolm McDowell, Chicago, Ill. A movable truck in combination with a second truck, mounted upon said truck and means for regulating the position of said second truck on said first truck at will, a shaft carried by the truck, means for oscillating the shaft on a center, a fork secured to the end of the shaft, and a hand-wheel secured to the shaft.

727,691. CUTTER-HEAD FOR DREDGES.—Arthur W. Robinson, Montreal, Canada. A cutting or stirring device for dredges, comprising two sets of cutting-blades, one set of cutting-blades located at the end of the other set and provided with converging ends which are rigidly fastened together.

727,694. ARTIFICIAL FUEL.—Charles F. Russi and Caledonio Cadena, San Antonia, Tex. An artificial fuel, consisting of the following ingredients by weight; sawdust, ½ part; manure, 1½ parts; sand, ¾ part; marl, ¾ part; clay 1 part, and lime-water in quantity sufficient to agglomerate the ingredients into a plastic mass.

727,751. MACHINE FOR MAKING WIRE ROPE.—Stephen W. Coriasco, Clinton, Mass. In a machine for making wire rope, the combination of a winding-head, supply-spool shafts journaled therein, intermediate gears connecting the shafts of the supply-spools, and a sun-and-planet gearing for driving a portion of the shafts.

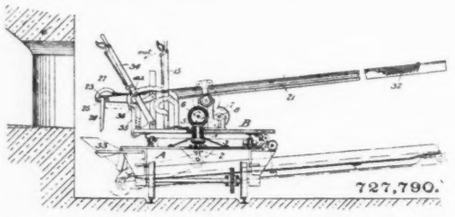
727,753 and 727,754. BLAST-FURNACE-CHARGING APPARATUS.—John C. Cromwell and Carl W. A. Koelkebeck, Cleveland, Ohio, assignors of three-fourths to the Garrett-Cromwell Engineering Company, Cleveland, Ohio.



In a blast-furnace-charging apparatus, an upper bell and hopper, a lower main bell and hopper, and a downwardly and inwardly inclined deflector arranged to receive the stock from the upper hopper and deflect it inwardly upon the lower bell.

727,758. IGNITING COMPOSITION AND METHOD OF MAKING SAME.—Otto Dieffenbach and Adolf Schäfer, Griesheim-on-the-Main, Germany, assignors to The Firm of Chemische Fabrik Griesheim Electron, Frankfort-on-the-Main, Germany. A herein-described process of making non-poisonous igniting composition which consists in grinding together phosphorus trisulphide and zinc oxide, mixing with such ground mixture potassium chlorate, iron oxide and ground glass and making a paste of the mixture by stirring and adding a solution of glue.

727,790. COKE-DRAWING MACHINE.—John A. Hebb, Smock, Pa., assignor to Hebb Coke Drawer Company, Uniontown, Pa. In apparatus for drawing coke, the combination with a reciprocating beam, of a pivotally-attached rake adapted to be folded backwardly by contact with the



coke, a spring device located remotely from the rake, and connections between the spring device and rake by which the rake is extended.

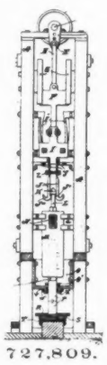
727,759. WIRE-ROPE SOCKET FOR WELL-DRILLING TOOLS.—Edward Double and Frank J. Karten, Los Angeles, Cal. In a well-drilling tool, the combination of a member having an inverted socket and a perforation extending up from said socket; an elongated perforated joint member having a semispherical portion to enter said socket; and a rope in the perforation of said joint member and extending through the perforation of the socketed member and being of less diameter than such perforation; said elongated portion being arranged to engage the socketed member and to hold the rope out of contact with the same.

727,787. PROCESS OF ANNEALING METAL PLATES.—Miller D. Grimm, Wellsville, Ohio. A process for annealing metal plates or sheets which consists in passing the plates or sheets through hot rolls, subjecting the plates or sheets to a bath of oil, placing the plates or sheets in an annealing-box within a furnace, conducting from said box the gases driven off from the oil on said plates or sheets, excluding air from the plates during said annealing operation through the attractive force of the vacuum produced by the expulsion of the gases and the subsequent cooling of the box, and then passing the plates or sheets through cold or polishing rolls.

727,791. REVERSING-VALVE FOR REGENERATIVE FURNACES.—James A. Herrick, Jenkintown, Pa. In a reversing-valve, a hollow butterfly having one or more open journals providing means for circulating water therethrough and through said butterfly, in combination with a chamber having cheeks between which and the edges of said butterfly there are free spaces to compensate for distortions and deposits and water-cooled bearings for said butterfly.

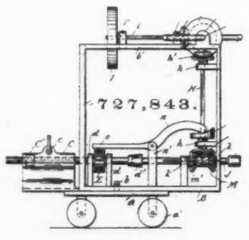
727,792. PRODUCTION OF PERMANGANATES.—Wilhelm Hickmann, Frankfort-on-the-Main, Germany, assignor to Society Chemische Fabrik Griesheim Electron, Frankfort-on-the-Main, Germany. A process for the electrolytic preparation of the permanganates of alkaline-earth metals, and other heavy metals, with simultaneous production of alkaline lye, hydrogen, and oxygen, or chloride, which process consists in subjecting a mixture consisting of a solution of an alkali permanganate or alkaline manganate and an oxygenated or halogen compound of one of the metals whose permanganate salt is to be obtained, to the action of an electric current, the electrodes being separated by means of a diaphragm or other suitable device.

727,809. STAMP-MILL.—Charles C. Lane, Los Angeles, Cal. A stamp-mill comprising a frame; a crank-shaft mounted in the upper portion. A pitman connected to said crank; a guide connected to the pitman; resilent gripping-prongs affixed to the guide; said gripping-prongs having catches on their adjacent faces, and outwardly and upwardly turned release-hooks on their lower ends; release-bars affixed to the frame, adapted to contact with the release hooks of the prongs on their upward movement and release the head of the stamp-stem from the prongs; a stamp having an upwardly-extending stem with a conical-shaped head; and a mortar having a removable die projecting through the bottom thereof.



727,813. ELECTROLYTIC MANUFACTURE OF CHLORATES AND PERCHLORATES.—Pierre Lederlin, Chedde, France. A method for the manufacture at a high constant yield of chlorates and perchlorates by the electrolysis of a chloride solution with the previous addition of a corresponding neutral chromate, consisting in maintaining the electrolyte during the electrolysis in a non-alkaline state by the addition of hydrochloric acid.

727,843. MINING-MACHINE.—William A. L. Roberson, Thacker, W. Va.; Robert Roberson, administrator of said William A. L. Roberson, deceased. In a mining-machine, the combination, with a frame provided with seperable arms at its rear end, a nut slidable longitudinally in the said arms, and means for clamping the nut between the said arms; of a feed-screw engaging with the said nut, and drilling mechanism carried by the said frame and operatively connected with the said feed-screw.



727,876. MACHINE FOR HOISTING, CONVEYING, OR EXCAVATING.—Frank E. Potter, Indianapolis, Ind. A traveling car for hoisting, conveying or for excavating, including two pairs of leg members having carrying-wheels, each pair of leg members disposed obliquely, main members forming the bases of a complete frame structure and secured to the middle portions of the leg members so that the leg members and the main members together resemble letters "A," a frame structure erected upon the main members and secured to the upper portions of the leg members, and a boom or arm mounted upon the frame structure.

727,845. ECONOMIZER FOR LIMEKILNS.—Thomas Ryan, Buxton, England. In an economizer for limekilns the combination of a receptacle for the limestone above the kiln, a pair of arches to support said receptacle, openings in said arches whereby fuel may be fed into the kiln, a series of ports adapted to supply air above the kiln, another series of ports at a higher level adapted to conduct a second supply of air above the first, and means for supplying air to said ports.

727,885. SWAGE-BLOCK.—Horace B. Blood, Rochester, N. Y. A device comprising a frame having standards connected with each other at their lower ends, open bearings in the upper ends of the said standards, an anvil having journals engaging the said open bearings, a clamping device for moving the upper ends of the standards toward each other, to engage the standards with the ends of the anvil, and resilent means for separating the standards and the ends of the anvil on opening the clamping device to permit the anvil to turn freely on its trunnions.

727,889. ELECTROLYTIC APPARATUS.—Frank J. Briggs, Everett, Mass., assignor of one-third to George F. Tarbell and Henry A. Locke, Cambridge, Mass. In an electrolytic apparatus, a dialyzer floating in the cell and sustained by the liquid therein.

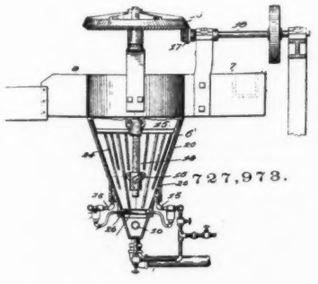
727,911. CONVEYER.—Henry M. Crites, Circleville, Ohio. The combination with a plurality of compartments, of a floor or platform situated over said compartments and provided with openings communicating therewith, a conveyer-chain provided with flights for conveying material over the platform and discharging it through the openings into the compartments beneath, axles carried at the ends of the flights and provided with rollers, guide-walls mounted on the platform at the ends of the conveyor-flights, tracks for the flight-rollers mounted on the platform within the guide-walls, and guides carried by the walls and overlying the tracks.

727,942. COKE-DRAWING MACHINE.—John A. Hebb, Uniontown, Pa., assignor to The Hebb Coke Drawer Company, Uniontown, Pa. In a coke-drawing machine provided with a rake, the combination of a main framework provided with supporting-wheels, a main driving-shaft, a counter-shaft at right angles thereto, a central vertical shaft, and gearing by which movement is transmitted from the main shaft to the counter-shaft and vertical shaft respectively.

727,943. COKE-DRAWING MACHINE.—John A. Hebb, Uniontown, Pa., assignor to The Hebb Coke Drawer Co., Uniontown, Pa. In apparatus for drawing coke, the combination with a reciprocating beam, of a pivotally attached scraper adapted to be folded backwardly by contact with the coke, a counterweighted lever pivoted to the beam, and a connection between said counterweighted lever and the scraper by which the scraper is extended.

727,958. ORE-CRUSHER.—Joseph A. Johnson, Los Angeles, Cal., assignor of one-half to George H. Stewart, Los Angeles, Cal. In ore-crushing machines, a frame the end thereof provided with a dovetailed groove, a crusher-bed having a dovetailed tongue adapted to be removably secured to the end of the frame, a drive-shaft mounted in the frame, an arm secured to the shaft and having a dovetailed slot therein, a movable jaw removably fastened to the said arm, an adjusting-rod adjustably mounted in the frame, a spring detachably connected to the said rod and to the rear face of the said arm and means adjustably connected to the rear end of the frame for limiting the rear movement of the said arm.

727,973. ROTARY ORE-CLASSIFIER.—John Klein, Desloge, Mo., assignor of one-third to Paul A. Fusz and



Charles D. McClure, St. Louis, Mo. In an ore-classifier, a hopper having an ore-inlet and a sludge-outlet arranged to discharge a stream of water in a horizontal plane at a distance above the bottom of the said hopper, an air-pipe arranged to discharge a stream of air laterally of and into the stream of water from said water-inlet, an annular amalgamating-trough in a plane above said water-inlet, pipes extending outwardly from said trough at various points in its circumference, amalgam-cups connecting with said pipes, and amalgamating-plates located above said trough with their lower ends terminating adjacent thereto.

727,974. ORE-CLASSIFIER.—John Klein, Desloge, Mo., assignor of one-fourth to Paul A. Fusz and Charles D. McLure, St. Louis, Mo. In an ore-classifier, a hopper, means for leading the mixture into the hopper; water-pipes leading into the hopper; overflow-troughs leading from the hopper; a plurality of air-pipes leading into the hopper; and a single rotary valve arranged with a multiplicity of radial air-passages to simultaneously interrupt the passage of air in all of said pipes.

727,997. ORE SEPARATING AND CONCENTRATING APPARATUS.—Francis E. Parker, Kansas City, Mo., assignor to United States Ore Reduction Company. The combination in separators for comminuted ores, of a longitudinally-extended, elevated, distributing-receptacle, a vibrating sifter beneath said receptacle, and longitudinally extended, perforate water-supply pipes on each side of the vibrating sifter, and oppositely-inclined water-deflecting plates beneath said perforate pipes and said vibrating sifter.

728,079. FLUX.—Harvey R. Brocius and Thomas A. Eshelman, Summerville, Pa. A fluxing compound, consisting of vaseline, hydrochloric acid, zinc, sal-ammoniac, borax and charcoal.

728,101 and 728,102. COKE-DRAWING MACHINE.—John A. Hebb, Uniontown, Pa., assignor to the Hebb Coke Drawer Co., Uniontown, Pa. In a coke-drawing machine; mechanism for transmitting longitudinal movement to the beam consisting of a driving-shaft, a driving-pinion secured to the shaft, toothed wheels loosely journaled on the shaft and provided with clutch portions, clutch devices in spline engagement with the shaft, adapted to engage said portions, and means for driving the toothed wheels in opposite directions.

728,103. ARTIFICIAL FUEL.—Ferdinand-Christoph von Heyderbrand und der Lasa, New York, N. Y. An artificial fuel composed of coal-tar, coal-oil, sawdust, clay, bituminous substances and carbonate of magnesia.

728,109. FURNACE FOR OXIDIZING METALS.—John W. H. James, Philadelphia, Pa. An oxidizing-furnace for producing pigments consisting of a rotating structure having an enlargement forming a pool for the molten metal and a portion below said pool down which the oxide is permitted to flow, and means for raising portions of the molten metal from said pool and pouring it back thereinto, in combination with means for heating said furnace, and for causing a flow of the oxidizing agent therethrough.

728,111. CAP AND PEEP-HOLE FOR BLAST-FURNACE TUYERES.—Guy R. Johnson, Joliet, Ill. A peep-hole attachment for blast-furnace tuyeres embodying a cap provided with guides and an eye-sight having a wedge-shaped carrier to engage the guides.

728,122. APPLIANCE FOR USE WITH METALLURGICAL OR CHEMICAL VESSELS.—William Lynes, Sparkhill, England. An appliance for exhausting or extracting and carrying away fumes and vapors from crucibles or other vessels, consisting of a hood, cap or cover adapted to be applied to the mouth of the crucible and provided with an inspection and pouring gap and with an outlet, and means for connecting the outlet with a suitable offtake.

728,125. LEACH-PITCHER.—John R. Morrison, Petoskey, Mich. A leach-pitcher comprising a truck mounted over a leaching-vat, a threaded nut held stationary upon the truck, a threaded shaft mounted to turn in said nut, scrapers or shovels adapted to be rotated by said shaft as the latter is moved longitudinally, and means for rotating said shaft.

728,126. PRECIPITATING APPARATUS.—Peter W. McCaffrey, Denver, Colo., assignor to the Union Ore Extraction and Reduction Company, Denver, Colo. In a precipitating apparatus, the combination of a tank for holding the solution, said tank being provided with a central partition, around the extremities of which the liquid is free to circulate, cylinders mounted to rotate on opposite sides of the said partition and partially immersed in the solution, said cylinders being perforated and containing scrap metal, and means for rotating the cylinders in reverse directions whereby the liquid is set in motion in a circular current.

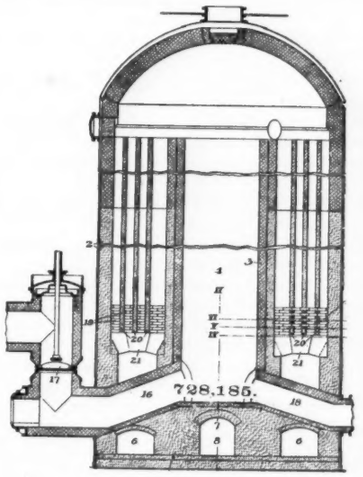
728,149. AIR-COMPRESSOR.—John C. Williams, Kansas City, Mo. An air-compressor comprising a storage-cylinder, a plurality of air-compressing tubes connected to the cylinder, plungers co-operating with and movable through the upper ends of said compressing-tubes, said plungers having upper open ends, counterbalancing-weights operating in connection with the plungers and contacting with the upper open ends of the latter, and operating mechanism attached to the said weights.

728,168. CONVEYING MECHANISM FOR COKE-DRAWING MACHINES.—John A. Hebb, Uniontown, Pa., assignor to the Hebb Coke Drawer Co., Uniontown, Pa. In combination with a coke-drawing machine provided with a longitudinally-movable rake; a transversely-arranged receiving-conveyer, an independent delivery-conveyer at an angle thereto, and means for driving both conveyers.

728,173. APPARATUS FOR PRODUCING LOW TEMPERATURES, THE LIQUEFACTION OF GASES, AND THE SEPARATION OF THE CONSTITUENTS OF GASEOUS MIXTURES.—Carl Linde, Munich, Germany, assignor of one-third to Charles F. Brush, Cleveland, Ohio. A counter-current and gas-liquefying apparatus consisting of a high-pressure conduit a gas compressor and cooler for maintaining a circulation of cooled compressed gas through the high-pressure conduit, an expansion-chamber, and a throttle of pressure-reducing valve, through which the compressed gas expands directly into said expansion-chamber, in combination with a low-pressure conduit connected at one end with said expansion-chamber.

728,180. COMPRESSED-AIR ELEVATOR FOR FLUIDS.—James W. Sloan, Corsicana, Tex., assignor of two-thirds to Joseph S. Cullinon and Horace G. Johnston, Corsicana, Tex. In a compressed-air elevator for fluids, a casing, a tube in said casing, the lower end of the tube being peripherally in contact with the inner surface of the casing, and the upper portion of the tube being separated from said casing, and said tube having superposed imperforate and perforated portions, and a valve in said tube for controlling the flow of fluid from said tube into the space between the tube and the casing.

728,185. HOT-BLAST STOVE.—Julian Kennedy, Pittsburg, Pa. A hot-blast stove having a lower annular flue with a central arch containing a cross-flue connecting the opposite



sides of the annular flue, a central combustion-chamber with its lower end over the arch, a gaseous inlet and hot-blast outlet leading into the lower end of the combustion-chamber, radial checker-work around the combustion-chamber and opening downwardly into the annular flue, said flue having a chimney-outlet and a cold-blast inlet leading into it.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending April 25, 1903.

8,759 of 1902. SAVING TIN FROM SCRAP.—W. H. Hemingway, London. Stripping tin from scrap in an acid bath of persulphate of iron, electrolytically depositing the tin, and reviving the bath by adding nitrate of soda and acid.

11,518 of 1902. ROCK DRILL.—G. H. Armstrong, Durham. A percussive rock drill enclosed in a casing which is adjustably mounted on framework.

13,097 of 1902. BALL MILL.—G. Sachsenberg, Rosslau-a-Elbe, Germany. A ball mill consisting of several compartments side by side, the material from each section being discharged through the center to the next.

14,017 of 1902. BLAST-FURNACE TOP.—P. Meehan, Lowellsville, Ohio, U. S. A. A blast furnace top designed to minimize the amount of fine ore and fuel carried out, and to return what is carried out back to the furnace.

24,167 of 1902. LONGWALL MINING SYSTEM.—W. C. Blackett, Durham. A modified system of long wall mining permitting the use of a continuous conveyor for carrying away the excavated coal instead of the more limited service by wagon at present used.

28,089 of 1902. CAR-LOADER.—T. M. Park, Darrington, Wahington, U. S. A. A car loader for excavated ores consisting of a tilted frame which carries conveyors.

28,396 of 1902. HARDENING IRON CASTINGS.—W. Gilmour and O. Lindsay, Montreal, Canada. Hardening iron castings by heating to a cherry red and dipping in a solution of arsenic sulphide in sulphuric acid.

28,948 of 1902. BLAST FURNACE ATTACHMENT.—A. von Kerpely, Vienna, Austria. A device for preventing the accumulation of liquid iron on the hearth of the blast furnace, consisting of a pipe communicating with the outside, on which the level of the iron may be regulated by air pressure.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mr. Arthur R. Townsend is at Salt Lake City.

Mr. Walter H. Weed has returned from Mexico.

Mr. John Hays Hammond will reach New York on May 26.

Mr. Harry C. James, of Denver, was in New York last week.

Mr. Ferdinand Sustersic is now at San Andres, Durango, Mex.

Mr. G. C. Hewett, of Colorado Springs, is in New York City.

Mr. Simon Guggenheim is due to arrive in New York from Europe on June 9.

Mr. Martin A. Smith, of Middleton, N. Y., recently went to Caribou, Colo.

Mr. R. H. Young has returned to Encampment, Wyo., after visiting the East.

Mr. C. L. Wright sailed by the *Alleghany* on May 18 en route to Medellin, Colombia.

Mr. S. W. Mudd, of Leadville, has returned after spending several months in Mexico.

Mr. J. W. Mercer, manager of the Zaruma Mines, Ecuador, has returned to New York.

Dr. James Douglas and Mr. Walter Douglas left New York for Bisbee, Ariz., on May 20.

Mr. Benjamin Chynoweth, of Houghton, Mich., is inspecting the Bisbee, Ariz., copper mines.

Mr. Henry C. King was recently inaugurated president of Oberlin College, at Oberlin, O.

Mr. Ben. B. Lawrence was at Denver last week. He will be returning to New York forthwith.

Mr. J. M. Gray has succeeded Mr. J. DeB. Hooper, as chief State mine inspector of Alabama.

Mr. A. P. Main, assistant manager of El Oro Mine, Mexico, is at home in Brooklyn, N. Y., on a visit.

Mr. M. F. Reitz, for some time past in Mexico, has gone to Arizona to examine copper properties there.

Mr. Percy Williams, of Salt Lake, Utah, is superintendent of the Silver Belle properties, near Tucson, Ariz.

Mr. Edward S. Brush and Mr. H. R. Wagner sailed by the *Kaiser Wilhelm* on May 19 en route to London.

Mr. Charles Chynoweth, of Calumet, Mich., is visiting the mines in the Globe and Warren districts of Arizona.

Mr. John B. Hastings has returned to New York City from a professional visit to Prince of Wales Island, Alaska.

Mr. C. W. Pritchett, mining engineer, of Denver, is examining mining properties near Magdalena, Mex., for Denver parties.

Mr. C. R. Clark, of Montezuma, Ia., one of the owners of the Federal Mines at Lovelock, Nev., was in California recently.

Mr. Karl Eilers has become consulting engineer to the American Smelting and Refining Company, at its New York office.

Mr. J. J. Hobson, manager of the Argus Mining and Tunnel Company, of Idaho Springs, Colo., is in Pennsylvania on business.

Capt. William Wiley, of Wiley, Mitchell & Co., New York, has returned from Mexico, where he has extensive mining interests.

Mr. John B. Farish, of Denver, Colo., spent a few days there last week, and left again on a professional trip to California and Mexico.

Messrs. A. Solvay and S. Solvay, of the Selmet-Solvay Company, Brussels, sailed for Europe recently, after a short visit to this side.

Mr. Charles D. Pierce, president of the Charles D. Pierce Well Engineering and Supply Company, of New York City, is now in Cuba.

Mr. L. Tovey, from Tomsk, Siberia, is about to visit the mining districts of this country, having arrived from Europe by the *Ivernia*.

Mr. Richard Eames, Jr., mining engineer for the La Fortuna Mining Company, has gone to Mexico to inspect work at the mines in Jalisco.

Capt. James Wilcox, superintendent of the Mass Mine at Mass City, Mich., has left for the Warren mining district of Cochise County, Ariz.

Mr. Edward Doerr has been appointed manager in Mexico for the Guggenheim Exploration Company, with offices at Tiburcio 27, Mexico City.

Mr. Adolph Franke, assistant director of the Berlin works of the Siemens & Halske Company, of Germany, is at present in this country on business.

Mr. Willard F. Snyder, manager of the Western Exploration Company, has returned to Salt Lake from the Balaklalla Mine in Shasta County, California.

Mr. E. D. Leavitt, consulting engineer of the Calumet & Hecla Mining Company, has returned to the East from a visit to the mine at Calumet, Mich.

Mr. C. Harlot, president and general manager of the Triunfo Mining Company, Sonora, Mex., is in the United States for the purpose of purchasing equipment.

Mr. E. E. Partz, superintendent of the Goldwin Mine, near Carters, Tuolumne County, Cal., left San Francisco for Central America recently on mining business.

Mr. R. J. Davidson, of Bath, N. Y., president of the Oregon Mines Exploration Company, operating the Snow Creek Mine, near Sumpter, Ore., has been in Sumpter.

Mr. Alton L. Dickerman recently resigned the management of the Park City, Utah, zinc plant ,and Mr. H. H. Dyer, a Colorado mining engineer, was appointed manager.

Mr. John L. Swan, now with the Ingersoll-Sergeant Company, early in June will become assistant to the president of the Longmead Iron Company at Conshohocken, Pa.

Mr. William McFaul, representing the Rand Drill Company and the Davis Calyx Drill Company, of New York City, has opened an office in the Rialto Building, San Francisco.

Mr. Henry Colbath, formerly assayer and metallurgist at the Consolidated Mercur plant, is now on the technical staff of the Bamberger-De La Mar Syndicate at De La Mar, Nev.

Mr. W. S. Gage, consulting engineer for G. Mitchell & Co., of Cornwall, England, arrived recently at Tacoma, Wash., from Valdez, Alaska, on mining business, and has gone to England.

Messrs. Edwin Fernald and S. W. Itsell, of Detroit, Mich., directors in the New York-Grass Valley Gold Mining Company, are at Grass Valley, Cal., inspecting the new plant of the company.

Mr. A. B. Knight, formerly professor of civil engineering in the Montana School of Mines, is consulting engineer of the Bismarck-Nugget Gulch Consolidated Mining Company, near Sheridan, Mont.

Mr. Wallace MacGregor, of Berkeley, Cal., has returned from Costa Rica, C. A., where he had been for several months erecting milling plants on the mines of the Abangarez Gold Fields, Limited, of New York.

Mr. George K. Fischer, who was in charge of construction of the Highland Boy and United States Mining smelters, has been selected as engineer for the Newhouse Mines and Smelters Company, of Utah.

Mr. S. P. Smith, Jr., superintendent of the Ocean Wave Coal Mine, near Florence, Colo., has resigned, and has been succeeded by James Stewart, superintendent of one of the Colorado Fuel and Iron Company's mines.

Mr. D. B. Reed, of Managua, Nicaragua, is now in the United States, and is purchasing electric equipment. He represents the interests of the Bullock Electric Manufacturing Company, Cincinnati, O., in Nicaragua.

Mr. W. B. Thompson, of Boston, Mass., a director of the Shannon Copper Company and president of the Coronado Copper Company, has been on a visit to England and Scotland, and returns to New York next week.

Col. Henry G. Heffron, formerly in charge of the ore purchasing department of the Bingham Consolidated Company at Salt Lake, Utah, has become identified with the management of the Gold Roads Mine, at Kingman, Ariz.

Mr. Godfrey D. Doveton, of the firm of Doveton & Purington, of Denver, Colo., has left for Torres, Mex., on metallurgical work for the Creston & Colorado Company. Mr. Doveton expects to be absent about three months.

Mr. Robert M. Olyphant, who recently resigned his position as president of the Delaware & Hudson Company, remains chairman of the executive committee. Mr. David Willcox, who has been vice-president, is now president.

Mr. E. J. Wilson has been appointed manager of the Northport, Wash., Smelter, to succeed Manager Watson. Mr. Wilson was formerly with the Great Falls, Mont., Smelter, the Philadelphia plant at Pueblo, Colo., and was manager of the Boundary Falls Smelter.

Mr. John Daniell, of Calumet, Mich., has resigned his position as engineer of the Franklin Mine. He is inspecting the Warren District of Cochise County, Ariz., at present, and will give particular attention to the Wolverine & Arizona Company, of which he is president.

Mr. N. M. Fenneman, professor of geology at the University of Colorado, and Mr. C. K. Leith, assistant professor of geology at the University of Wisconsin, have been appointed professors of geology in the latter university in view of the election of Prof. C. R. Van Hise to the presidency.

Prof. C. K. Leith, of the University of Wisconsin, recently went with a party of geologists and students to the Vermilion and Mesabi ranges in Minnesota, the Gogebic and Marquette districts in Michigan, and to the copper country. Accompanying the party were Dr. A. P. Low and Dr. A. E. Barlow, of the Canadian Geological Survey; Messrs. T. B. Caldwell, of Larnak, Ont., and Kirby Thomas, of Superior, Wis.; Dr. J. Morgan Clement, of the United States Geological Survey; Prof. A. E. Seaman, of the Michigan College of Mines, and Prof. Frank D. Adams, of McGill University, Montreal.

OBITUARY.

Benjamin Franklin Jones, of the Jones & Laughlin Steel Company, died at his home in Alleghany, Pa., on May 19, of a nervous ailment. Mr. Jones was born in Clayville, Pa., August 8, 1824. When he was 13 his family moved to New Brighton, where he secured an academic education. At the age of 19 Mr. Jones went to Pittsburg, and secured a position with a company operating boats on the canal between Pittsburg and Philadelphia. From 1847 to 1854 he was a partner in a rival line. About 1846 he purchased, with his partner, an iron furnace and forges near Armaugh, in Westmoreland County, and in 1857 took an interest in the American Iron Works, which in 1857 became the firm of Jones, Laughlin & Co., a name famous in the annals of the Pittsburg iron industry, Mr. Jones gaining wide repute as an iron master and a business man. The firm subsequently became Jones & Laughlins Company, Limited, and last August was reorganized as the Jones & Laughlin Steel Company. Mr. Jones then retired from active management after 50 years of service, and was succeeded as president by his son, B. F. Jones, Jr.

SOCIETIES AND TECHNICAL SCHOOLS.

AMERICAN MINING CONGRESS.—Incorporation papers have been filed at Denver, Colo.

COLORADO SCIENTIFIC SOCIETY.—The president of this Society has appointed the following gentlemen to act as a committee for the purpose of investigating the relative commercial value of the volumetric and fire assays of lead ores: Prof. C. S. Palmer, Richard Pearce, Philip Argall, W. F. Hildebrand, E. C. Woodward, E. N. Hawkins, A. W. Warwick, Henry E. Wood, Prof. Rose, of Golden.

WORCESTER POLYTECHNIC INSTITUTE.—This institute at Worcester, Mass., by its catalogue for the current year, shows a total enrollment of 248 students, of whom 50 were taking the course in electrical engineering and 49 mechanical engineering. The The school offers courses of study in mechanical enschool offers courses of study in mechanical science and eelctrical engineering. The courses are each four years in length, though all are identical during the freshman year. The institute is well equipped with workshops and with chemical, physical, mechanical and electrical laboratories.

NEW MEXICO SCHOOL OF MINES.—Scholarships in mining, to the number of 50, have been established by this school at Socorro, New Mexico. The awardment will take place at the beginning of the next semester, early in September.

Charles T. Lincoln, chemist to the Bell Telephone Company, Boston, has been made acting professor of chemistry and director of the chemical laboratories.

Prof. J. F. Atkinson, of Missouri, has been made assistant professor of methematics. Prof. Francis

C. Lincoln, of Colorado, has been elected to the chair of metallurgy. Carl Edward Magnusson, of Wisconsin University, has received the apointment of professor of physics and electrical engineering.

INDUSTRIAL NOTES.

The plant of the Virginia-Carolina Chemical Company at Birmingham, Ala., recently burned, is to be rebuilt.

The Oil Well Supply Company, of Pittsburg, Pa., is about to close an important contract for machinery to be shipped to Vera Cruz, Mex.

The Risdon Iron Works, of San Francisco, has secured a contract for 2,000 tons of steel pipe to be used on a large Mexican hydraulic plant.

The Atlas Tack Company has recently installed a large number of Nernst lamps, made by the Nernst Lamp Company, of Pittsburg, in its factory at Fairhaven, Mass.

The A. Wyckoff & Son Company, of Elmira, N. Y., has an order for a mile and a half of wood pipes for use as a fresh water supply line, from Coxe Brothers & Co., of Drifton, Pa.

At a meeting of the American Steel Foundries Company, held recently, Charles M. Schwab and E. H. Gary, both of the United States Steel Corporation, were elected directors. They succeed H. K. Wood, and K. K. McLaren.

The Societe Anonyme Westinghouse, which looks after the Westinghouse interests in France and other Continental European countries, has secured a contract for the installation of the mechanical plant for the large hydro-electric plant to be installed at Clermont Ferrand.

The assets of the Asphalt Company of America and of the National Asphalt Company were recently sold in Jersey City under the direction of Receiver Henry Tatnall by order of the United States Court. The only bidder was Henry C. Everdell, whose bid of $6,006,000 was accepted.

Wonham & Magor, of No. 29 Broadway, New York, have received a rail contract on behalf of the steel jobbing house of Suren, Hartmann & Co., of London, for about 4,000 tons of rails for Cuba, and a contract for about 4,000 tons of steel rails—T and girder—for the Manila electric traction system.

The E. I. Dupont-de Nemours Powder Company was incorporated at Trenton, N. J., recently, with a capital of $50,000,000, $25,000,000 preferred and $25,000,000 common stock, to manufacture dynamite and powder. The incorporators are William H. Dutton and William A. De Witt, of New York, and J. H. P. Reilly, of Hoboken, N. J.

The Pacific Gear and Tool Works, of San Francisco, Cal., announces that it has succeeded to the business of P. T. Taylor & Co., and is prepared to furnish on short notice cast, cut and rawhide gears of every description. P. L. Bannan, former manager of P. T. Taylor & Co., is president and manager of the new company.

The Keasbey & Mattison Company states that neither the Robert A. Keasbey Company nor Robert A. Keasbey individually as agent or otherwise, has any further connection with the Keasbey & Mattison Company's 85 per cent magnesia and other K. & M. coverings, and that all orders for these goods are now supplied through its own office at 84 John Street, New York.

The Under-Feed Stoker Company, of Chicago, Ill., has secured a contract from E. H. Hunter & Co., of Yokohama. The company has also recently taken contracts for stokers to be installed in the plants of the Montreal Street Railway, Montreal; Dominion Coal Company, Sydney, Cape Breton; Intercolonial Railway, Halifax, N. S., and the Standard Drain Pipe Company, New Glasgow, N. S.

At a recent meeting of the stockholders of the Brady's Bend Fire Brick Company, of Brady's Bend, Pa., A. P. Weidman was elected president; Isaac Kaufman, vice-president; Edward W. Dewey, secretary, and Morris D. Kaufman, treasurer. Contracts for the buildings and machinery are reported awarded to Victor Beutner, who designed the plant. The capital stock of the company has been increased to $100,000.

More than 2,500 tons of iron pipe, manufactured by the National Tube Company, were shipped to various foreign countries last month via New York and other Eastern seaboard points. The principal shipments went to Continental Europe, 1,101 tons out of 1,227 going to Antwerp, the balance going to Copenhagen, Havre and Barcelona. Two hundred and forty-seven tons went to Great Britain. China and Japan were sent 503 tons, while 270 tons went to Colon.

The increasing demand for Christensen air brakes and Ceco electrical machinery has made a change necessary in the organization of the Christensen Engineering Company, of Milwaukee, Wis. To accomplish this the owners of the stock of the company have organized the National Electric Company, and the assets, good-will, etc., of the Christensen Company have been transferred to the National Electric Company, the purposes, ownership, management and control of the new company being identical with those of the old.

Fraser & Chalmers, Limited, a British corporation, is now placing orders for mining and other machinery in this country for shipment to South Africa. The firm represents the South African interests of the Rand Drill Company, the New York Lubricating Oil Company, the Robbins Conveying Belt Company, the Manhattan Rubber Company, the Knowles branch of the International Steam Pump Company, and the Wheeler Condenser and Engineering Company, all of New York; the Jones & Laughlin Steel Company, of Pittsburg, Pa.; the Chapman Valve Manufacturing Company, of Boston, Mass.; the Nicholson File Company, of Providence, R. I., and the Sullivan Machinery Company, of Chicago, Ill.

The American Steel and Wire Company shipped to foreign countries during April about 8,500 tons of wire and wire nails. Of the wire 1,429 tons went to Australia and 1,127 to South America. The shipments of wire to Europe amounted to 604 tons, of which Great Britain received 457. Smaller shipments were made to Cuba, Mexico, Porto Rico, China and Japan. The nail exports were nearly 4,000 tons, an increase of more than 100 per cent over March. China and Japan were forwarded 2,133 tons. One shipment aggregated 1,451 tons, the largest individual shipment of wire nails ever made from the United States. The United Kingdom took 657 tons. Smaller shipments were made to Australia, South Africa, the Argentine Republic, Cuba, Mexico and Manila.

The International Portland Cement Company, of Ottawa, Canada, which is composed of interests identical with those of the Southern States Portland Cement Company, Rockmart, Ga.; the Peninsula Portland Cement Company, of Jackson, Mich., and the National Portland Cement Company, of Durham, Ont., is about to erect a large cement-making plant at Ottawa, to be operated by electrical power. The initial capacity of the plant will be 1,600 bbls. daily. Contracts will be let shortly for rotary converters and several motors. John A. Mead & Co., Bowling Green Building, New York City, recently secured a contract for a large hot and cold cement clinker conveying plant to be installed at the Ottawa plant. The equipment will handle the clinker from the rotary kilns to the clinker storage and thence to the dry grinder mills.

The Iola Portland Cement Company has ordered from Westinghouse, Church, Kerr & Co. a 280-h.p., 3-cylinder vertical gas engine as an addition to the power equipment of its cement plant at Iola, Kan. The company uses natural gas, and its equipment now comprises 12 engines of the Westinghouse vertical 3-cylinder and 2-cylinder single-acting type, aggregating 2,100 h.p. These engines operate rock crushers, rotary kilns, line shafting and electric generators. With the additional engine the power plant will comprise 6 engines of 280 h.p. each, 5 of 125 h.p. each, and 2 small engines. The 125-h.p. engines are used for driving the kilns and the 280-h.p. for the rotary crushers. The machinery is in general arranged in groups upon sections of counter shafting driven by a single engine either direct connected or by rope drive.

During the last four months the Pacific department of the Pelton Water Wheel Company has received contracts for waterwheels for these important installations: Vancouver Power Company, Vancouver, B. C., three 3,000-h.p. units, 9,000 h.p. maximum capacity; each main unit to consist of two wheels, one mounted on each end of extended generator shaft, to operate under a 390-ft. head, and run at a speed of 200 revolutions. The nozzles are of the improved Pelton combination, deflecting and needle type, hydraulically balanced. The Northern California Power Company has given the Pelton Company another order for two 3,000-h.p. units to operate under a 1,150-ft. head. By means of flexible leather link coupling, power will be transmitted from both ends of each waterwheel shaft to two 1,500-h.p. generators, which will run at a speed of 300 revolutions per minute; maximum capacity of plant, 6,000 h.p. The Gwin Mine Development Company, Valley Springs, Cal., is installing a hoist with a capacity of 20,000 lbs., at a speed of 1,200 ft. per minute, power derived from two 9-ft. diameter Pelton wheels operating valves, one valve to control the three gates on each nozzle. This will excel the capacity of the famous Utica hoist, which consists of two 10-ft. Pelton wheels, and lifts 18,500 lbs. from a depth of 2,000 ft. at a speed of 700 ft. per minute. The Siskiyou Electric Power Company, of Yreka, Cal., is about to install a 1,000-h.p. unit, which consists of one Pelton wheel, operating under a 689-ft. head, and directly connected to a 750-kw. generator by flexible leather link coupling.

The Loomis-Pettibone Company has removed its New York offices from No. 52 Broadway to 52 and 54 William Street, has increased its capitalization to $2,000,000, and is about to begin the construction of a large plant, near New York City, for the manufacture of gas engines in large units, in addition to the Loomis-Pettibone gas apparatus. The name of the new company is the Loomis-Pettibone Gas Machinery Company, and its officers and directors are: Benjamin Guggenheim, president; Cyrus Robinson, first vice-president and general manager; Burdett Loomis, Jr., second vice-president and manager sales department; Leon P. Feustman, secretary and treasurer; Burdett Loomis, Sr., Consulting Engineer; Hawley Pettibone, chief engineer; Charles E. Finney. The company is prepared to enter into contracts for the equipment of complete plants, gas generators, gas engines and electric generators and motors. Until its plant is ready to turn out large gas engine, it will deliver the engines manufactured by Crossley Brothers, Limited, of Manchester, Eng., for which it has the exclusive agency for North America. The Loomis-Pettibone Company has installed a number of large gas engine plants in the United States and Mexico, including Minas Tecolotes y Anexas, Guggenheim Exploration Company, owners, Santa Barbara, Chihuahua, Mex., capacity 700 h.p.; Montezuma Copper Company, Phelps, Dodge & Co., owners, Nacosari, Sonora, Mex., capacity 1,000 h.p.; Detroit Copper Mining Company, Phelps, Dodge & Co., owners, Morenci, Ariz., capacity 1,000 h.p.; Winchester Repeating Arms Company, New Haven, Conn., capacity 1,000 h.p. Of new contracts the company mentions one for the Velardena Mining and Smelting Company, of Velardena, Durango, Mex., for 2,000-h.p. gas engines, operating from a central power station; Rockland Electric Company, Hillburn, Rockland County, N. Y., 1,200-h.p. gas engines operating direct current electric generators; Potosina Electric Company, San Luis Potosi, Mex., about 600-h.p. direct-connected gas engines furnishing electricity for power and light. The company states that it is producing power with a consumption of 2.5 lbs. of wood per brake h.p.-hour, or of 1 lb. of good bituminous coal.

TRADE CATALOGUES.

A little circular sent out by the Quincy Engine Works, of Quincy, Ill., briefly describes the advantages of the company's 4-plunger motor-driven high-service pumps.

The Gardner Electric Drill and Machinery Company, of Cleveland, O., sends out through its Denver office copies of articles that have appeared in Denver papers regarding the results of trial contests between the Gardner and other electric rock drills, in which the Gardner came out ahead.

The Graton & Knight Manufacturing Company calls attention to the splendid reputation its Royal Worcester belting has gained by 50 years' use in leading factories all over the United States. The company will gladly send circulars describing this belting and prices to any manufacturer.

The Mechanical Boiler Cleaner Company, of Chicago, Ill., publishes a 30-page pamphlet calling attention to the merits of the Garrigus cleaner, a mechanical device within the boiler for removing sediment and oil, thus preventing incrustation and increasing the life and efficiency of the boiler and engine. The device is provided with a scum-guides and a skimmer, by which the impurities that rise to the surface of the water are collected and discharged into a precipitator outside the boiler.

The Eclipse drill sharpener for quickly and cheaply re-sharpening the bits of power-drills, and for manufacturing drill bits, is described in a little 12-page pamphlet, published by the Hendrie & Bolthoff Manufacturing Company, of Denver, Colo. The machine includes two air-drills, one used as a striking hammer on the anvil portion, and the other supplying the striking power for the dollies that finish the shaping of the bits. The pamphlet states that a bit finished with this machine is far superior to the hand-made article in that the cutting edges are of equal thickness and are always at right-angles to the shank. The machine is recommended to mining men having 10 or more machine drills in use.

SPECIAL CORRESPONDENCE

Denver. May 16.

(From Our Special Correspondent.)

Denver, like many other cities throughout the country, is having labor troubles, various local unions having struck and an increasing number of other local unions being arbitrarily called out on "sympathetic" strikes, by the Central Labor Committee. On the other hand, a citizens' alliance has been organized, already having thousands of members, from the local employers of labor and others, its object being to resist the intolerable demands and growing tyranny of the labor unions, and to prevent a general tie-up of business in Denver. The latest phase of the situation is that the executive committee of the Citizens' Al-

liance has proposed to the executive committee of the labor unions, that a committee of 11 men, five chosen by the Alliance, five by the labor unions, and the 11th member selected by the 10, shall be created an arbitration committee, to which all grievances shall be submitted. This proposition was not only rejected, but the executive committee of the labor unions has declined to hold any further intercourse with the Citizens' Alliance.

The reasons for mentioning the subject here are that the labor unions of Denver have the moral support and are promised the active support of the Western Federation of Miners, and the strike leaders threaten to call out the Western Federation of Miners soon, in sympathy with the Denver movement. The president of the labor unions of Denver and a number of his associates, like the president of the Western Federation of Miners and several of his associates, are blatant Socialists, apparently more disposed to use labor troubles for the spread of Socialistic doctrines than to co-operate in the amicable settlement of labor troubles. The Executive Committee of the labor unions of Denver has issued a characteristic manifesto absurdly charging that the "smelter trust" is the real inspirer of the Denver Citizens' Alliance, though the Denver employers were compelled to organize in self-defence.

The Colorado Fuel and Iron Company is not only the largest mine operator, but the largest single employer of labor in the State, the company's pay-roll probably representing 10 per cent of the adult male population of Colorado. The company has 23 coal mines in Fremont, Gunnison, Garfield, Pitkin, Huerfano and Las Animas counties, and expects to mine 6,000,000 tons of coal (bituminous, semi-bituminous and anthracite) during the current year.

The company owns and operates iron mines at Orient, Saguache County, and at Fierro, Grant County, N. M., and Sunrise, Laramie County, Wyo. The Sunrise mines are now producing about 1,000 tons per day of red hematite ore, with a force of 190 men. The ore has been hitherto largely mined by steam shovel, but a shaft is now being sunk. The company is also about to build a spur five miles long, to open up another ore-body nearby.

The Orient mines are producing about 300 tons daily of limonite iron ore, with a force of 70 men, and the Fierro mines are producing about 400 tons daliy of a mixture of manganese and hematite ores, with a force of 200 men. The company is receiving about 150 tons daily of manganiferous ore from mines at Leadville, and has acquired a manganese property on the Rio Grande Western Railroad in Utah, now being opened by a force of 30 men.

San Francisco. May 13.

(From Our Special Correspondent.)

The so-called "Salt Trust," or Federal Salt Company, which was prosecuted criminally by the Government for violating the Sherman anti-trust law, has pleaded guilty before the United States Court. The trust controlled about 90 per cent of the salt trade on the Coast, and eventually brought the prices up from about $3 per ton to $25 per ton. A queer feature of the matter was that the Continental Salt and Chemical Company, of San Francisco, agreed to sell its entire product for some years to the Trust, which in the end refused to pay for the salt under its contract on the ground that the contract was illegal, being in restraint of trade. It is thought a fine of $5,000 will be imposed.

There is some considerable disappointment among oil men at the apparent non-success of the 300-mile pipe line of the Standard Oil Company from Kern County to San Francisco Bay. The line has cost about $3,000,000, and the company has contracted with oil well owners for delivery of about 15,000,000 bbls. of oil and 10,000 bbls. per day were to be delivered through the pipe line to the refineries at Point Richmond. The heavy Bakersfield oil refuses to run through at the desired rate, and it is supposed the present number of stations, 28, will have to be doubled. Thus far the oil has got only about half way, and if the number of pumping stations has to be doubled the cost of transporting by pipe may be little less than by rail. The Midland Pacific Railroad Company, which intends building from the oil belt of Kern to the harbor at Port Harford, San Luis Obispo County, would give relief to the oil men, but after building 12 miles of road has ceased operations for a time. The promoters contend that they will eventually finish the road. There is plenty of oil, but transportation at moderate cost is a hard problem, harder than was anticipated.

In Trinity County a decree has been issued, winding up the affairs of the Brown Bear Mining Company, and ordering the mine sold. During the suit it was shown that the profit in the past eight years has been $255,000, that $148,500 in dividends had been paid, and the Watt tunnel, costing $98,000 was built. On June 1, unless more ore is found, the Brown Bear Mine will cease, though Charles Dobler, the superindent, believes that by spending $100,000 in development, another ore-body could be found. No dividends have been paid since 1898.

The caller of the Los Angeles Mining Exchange has disappeared "under a cloud," and all sorts of charges of crookedness are made against him. The caller was the man who orgnized the Exchange last winter, claiming to have had experience with similar concerns in Denver and Salt Lake. The Exchange has not done any very large amount of business so far.

A strike of good gravel is reported at the end of the 6,000-ft. tunnel of the Bellevue drift mine, near Gibsonville, in Sierra County. The original shaft, known as the Thistle or Feather Fork, was about 500 ft. deep, and the gravel was hoisted through it for some years. It was the only large drift mine of the State worked by a shaft. Finally water drowned the mine. The cost of working by shaft was great on account of pumping. The channel was rich and of good size. Out of the wreck of the old property C. B. Wingate formed the Bellevue Company, and started in a couple of years ago to run the long bedrock tunnel that has cut the "blue lead" gravel.

The Geological Department of the University of California is to put four separate parties in the field, and will do considerable work in Shasta County. There is also to be some palaeontological work in Idaho.

The California State Mining Bureau has just completed investigations of the quicksilver fields of San Luis Obispo County, and the field assistant is now busy on similar work in Santa Clara County.

San Luis Potosi, Mex. May 12.

(From Our Special Correspondent.)

Mr. John Hays Hammond has examined the Dolores Mine for the Guggenheim Exploration Company. At the Palmarejo mines, Chihuahua, where some millions were spent with scarcely any returns. Mr. T. H. Oxnam is getting results by the cyanide process, and in March the mine gave net earnings of over $20,000. Six miles from Terrazas, at the Victoria camp, Felix McDonald and the Dale Brothers are doing much work on the Santa Alicia Mine, where they have 22 pertinencias. The Boston & Chihuahua Mining Company, a mile and a half from Terrazas, is working a large body of low-grade ore, which, being near the railroad is giving good returns. At the Corregidor Mine, seven miles from Cusihuiriachic, in the Cerro Cenizo Mountains, the Helena Mining Company has made some rich strikes. On El Potosi, near La Descubridora, Chihuahua, the Kraft Brothers have started work, with Thomas Williams as superintendent; and at La Descubridora a 500-ton smelter is in contemplation.

For the Minillas Mine, near Chihuahua, a deal is pending, and in the Unique District the Nueva Anaconda Mine, having 36 pertinencias adjoining the old Bahuerachic mines, has been sold to a Los Angeles company for $75,000, gold. The Jesus Maria mines, of Bahuerachic, have been sold to W. W. Graham, vice-president of the American Bank in the City of Mexico, and his associates. The property was formerly regarded as a great gold mine, has now developed into a copper mine; its value, as well as that of La Nueva Anaconda, will be greatly enhanced as soon as the Kansas City, Mexico & Orient Railroad reaches the district. The Adela Mine, near Parral, is shipping something like 60 tons a day of high-grade concentrates from the new mill. Considerable talk is being heard over the placer work soon to be started at Santo Domingo, on the Conchos River, but just what it amounts to seems difficult to learn, nor can definite information be obtained in regard to the oil reported near Coyoame.

Santiago y Anexas, on San Mateo Mountain, Tlalpujahua, which yielded fabulous amounts to its former owner, Jose Maria Mora, has been sold by Samuel Lederer to an American company at a price not made public. Work has started by the Tlalpujahua Mining Company, on La Noche Buena mines, organized last month, with a capital of $200,000, Albert Hohenthal being president. The production of the three leading properties, Dos Estrellas, La Esperanza and El Oro, it is estimated, will reach this year $18,000,000, increasing the Mexican production of gold by over 20 per cent. The last has already completed arrangements for increasing the mill from 100 to 200 stamps. The other larger properties of the district are the San Francisco, which recently changed hands for $1,000,000 gold, and the Santa Rosa, for which it is understood $500,000, gold, have been offered by New York men.

The greatest rival to El Oro is the Taveche District of Oaxaca, where really more work is being done. The richest mines of the district are the Natividad, San Francisco, and La Escuadra. The last was first opened by C. A. Hamilton, and $1,000,000 has been refused for it, according to reports. Natividad Mine, which for three years has kept up regular monthly dividends of $10 a share, was recently purchased by Canadian capitalists for $1,500,000. The Zapota and Carpenteria, bought by Messrs. Thompson and Vickery, for $400,000 and $40,000, gold, respectively, continue to make excellent showings. Messrs. Nebbins, White and Butler have a rich property in the South Carolina. The Providencia and the Ingatsol, near by, both have a fine vein. The Conejo Colorado is opening up well, San Juan Bautista has rich ore, and is paying, and the Maggie Mine, on Rio Danda, being developed by San Francisco capital, has exposed some good ore, but work is temporarily suspended on account of water. At the San Martin, in the Ocotlan District, the new mill is in operation. In the Ejutla District the Ocotes is shipping 10 tons a day of ore running close to 20 per cent copper and 40 to 50 oz. silver, and the California, adjoining it, worked by Mr. W. H. Dudley, will soon be shipping.

Exchange on New York began the week at 232, and closed on Saturday at 234, but there was very little business done, as there is a strong feeling that silver will advance.

Stocks continue rather quiet, there being some transfers in Santa Maria de La Paz, Matehuala, at $720; Providencia, Guanajuato, at $145; Carmen, Santa Gertrudis, San Rafael and Sorpresa, all of Pachuca, at $80.50, $135, $370 and $315, respectively; Guadalupe, San Luis Potosi, at $80.50; Amistad y Concordia, at $72.50. Victoria y Anexas, of El Oro, though $100 par, with only $15 paid, and $5 assessment called, was selling at $75 to $80.

London. May 6.

(From Our Special Correspondent.)

The troubles of the Nile Valley Company are not yet at an end. It will be remembered that this company, owning concessions in Upper Egypt, proposed to reconstruct on a large scale in order to obtain further working capital from Mr. J. B. Robinson, the Rand magnate, but that the Egyptian Government would not consent to the new scheme unless present shareholders also subscribed further cash. The proposition to which the Government agreed, was that shareholders should be given four shares in the new company for each one in the old, that they should subscribe for one new share in the new company at par, £1, and that some 30,000 shares should be issued to Mr. Robinson at 30s. each. The original scheme, to which the Government did not assent, was that the shareholders should be given five new shares for each old one without subscribing any cash. A hitch has now arisen, owing to Mr. Robinson's refusal to pay 30s. for his shares when old shareholders are having them offered at £1, and for the moment the scheme is hung up. The agreement with Mr. Robinson to take shares at 30s. was made before the revised scheme was submitted to the Government, when it was not contemplated for the old shareholders to subscribe for this capital. Under the altered circumstances it is a nice point for lawyers to decide, whether Mr. Robinson is liable to fulfil the agreement. My own opinion is that the old shareholders are obtaining such very liberal terms in the reconstruction that they could well afford to sell 45,000 shares at par to Mr. Robinson instead of 30,000 at 50 per cent premium, and this may be the eventual settlement of the dispute.

Six months ago I mentioned that the Mysore Gold Mining Company had acquired additional land to the west of its properties, belonging to the Gold Fields of Mysore Company, as the Mysore lodes dip to the west and at depth pass out of the boundary. A similar scheme is now being placed before the shareholders of the Champion Reef Company. This mine is developing extremely well at depth, and there is every probability that the lodes will continue in the land now being brought from the Gold Fields Company. The purchase price is £20,000 in cash and 10,000 shares in the Champion Reef Company, the market value of which is about £75,000 at present quotations. In order to provide these funds, and at the same time to porvide additional working capital, the directors propose to issue 47,000 new shares, and to offer them to shareholders at £6 each. After the shares and cash have been paid to the Gold-Fields Company there will remain £202,000 in cash as additional working capital. This money will be devoted to sinking a new main shaft, and to providing additional plant. It will be noted by readers that this plan for providing money for extensions and improvements is essentially different from that advocated by Mr. Moreing in the case of Great Fingall, to which I referred at length last week. Mr. Moreing holds that such expenses should, when practicable, always be met out of income, and he would undoubtedly recommend this principle in the case of the Champion Reef, as the mine is quite capable of meeting the expenditure without seriously decreasing the dividends. It has, however, been invariably the plan adopted in the Mysore group to meet extra expenditure by creating new capital ,and the plan has never been seriously objected to by shareholders. That the present proposition will be agreed to is hardly open to doubt, but in view of Mr. Moreing's recent pronouncement, there is sure to be some discussion on the question at the meeting of shareholders.

The final stage of the Panuco Copper Company has at last been reached by the official receiver in bankruptcy advertising that the property will be sold without reserve. It is just four years since the company was formed to acquire the mine of that name, in Coahuila, Mexico, and as it was floated here under the auspices of Matheson & Co., it was well taken

up. Not long afterwards it was found, on investigation, that the agents of the English vendors had been the victims of an imposition. On the company going into liquidation it was decided to sell the property, but no satisfactory bids were made. Efforts were then made by the liquidator and a committee of shareholders to further test the property, and for some time work was carried on, but the results were unsatisfactory, and the property is now being offered for sale without reserve. The plant and stores, at any rate, will be worth bidding for, and Americans may find it worth while to apply to Strong & Cadwalader, 40 Wall Street, New York, who have the matter in charge there.

In several of my previous letters I have mentioned the excellent results now being given by the various West Australian mining companies where work is being organized in miner-like fashion. This week I am able to report that the Oroya Brownhill Company has also arrived at dignified prosperity. The company is an amalgamation of the Hannans Oroya and Hannans Brownhill, an arrangement which was effected in July last year. It will be remembered that more recently it was proposed to amalagamate with two other adjoining companies, but terms could not be arranged. Judging by the results since obtained by the Oroya Brownhill, the terms proposed were not favorable to that company, by any means, so that the directors and shareholders are glad the scheme fell through. The profit for 1902 is derived from a whole year's working of the Brownhill and six months' working of the Oroya, and amounts to £83,000, while £73,000 is also written off for depreciation of former plant. Developments have progressed satisfactorily on both properties, and the rich ore shoots have been followed for some distance. On December 31 last the ore in sight on the Brownhill was 62,000 tons, averaging 2 oz., and 48,500 averaging 4 oz. on the Oroya, while there is also 110,000 tons on the South Block, averaging $15. Since then further bodies have been opened up, but their extent and contents not fully measured. At present 30 stamps are running, and an additional 10 will be added shortly. It is estimated that in future the output will be so regular that dividends will be distributed quarterly. A dividend of 10 per cent was paid the other day, and it is intended to pay four more for the year, making 40 per cent in all. The capital of the company is £450,000, so that the total distribution will be £180,000 per annum, a figure which will place the company on a level with Perseverance, Horseshoe and Ivanhoe. I ought to mention that the general managers of the company are Bewick, Moreing & Co., the firm which has done so much to put West Australian mining on a reputable footing.

The report of the Montana Mining Company for the half year ended December 31 last shows that this company is still making a profit out of the once famous Drumlummon Mine. Though a loss of $11,000 was made in milling, a profit of $43,000 was made by the tailings and slimes plant. The milling results showed a yield of $3.86 per ton in gold and 27c. in silver, from 14,450 tons treated. The total amount of tailings treated was 60,000 tons, yielding an average of $1.68 in gold and 33c. in silver, the total yield being valued at $120,507, at a cost of $76,961. The recently acquired Lucky Girl, at Edgemont, Nev., has not been very profitable, as the 20-stamp mill and cyanide plant yielded conjointly only $5.54 per ton, while the profit realized on 9,000 tons thus treated was only $1,459. The directors are still looking out for new properties, and they have £55,000 cash on hand, wherewith to purchase and equip.

Sydney, N. S. W. April 14.

Queensland.—The gold returns for March amounted to 55,686 oz. fine, valued at £236,548, as against 44,105 oz. fine, valued at £187,358 for the corresponding month of 1902.

Goldfield:	Calls.	Dividends.
Charters Towers	£11,867	£45,110
Croydon	488	500
Gympie	4,387	30,200
Mount Morgan	Nil.	12,500
Ravenswood	1,225	.....

The first quarter was better than last year, the yield in 1903 being 148,412 oz. fine, valued at £630,439, as against 127,412 oz. fine, valued at £541,248 in 1902. The total dividends for the first quarter, amounting to £213,796, compared with £160,285 for 1902.

The South Glanmire and Monkland crushed 1,670 tons for 2,500½ oz. smelted gold, and has declared a dividend of 1s. per share.

The furnace of the Mt. Garnet Freehold has been closed, owing to gales and floods stopping the delivery of coke.

The gold yield for 1902 was the largest for rock raised in any one year, though in 1900 the total yield was greater. Last year's yield was 640,463 oz. fine, valued at £2,720,639 ($13,175,100). Dividends paid during the year by gold mines amounted to £961,762 ($4,264,545).

The No. 2 South Great Eastern, Gympie, is looking well. The reef at the south end, immediately above the 1,320 level, looks as if it were going to prove crushing stuff right through from No. 2 to No. 3 reef. Neither hanging nor foot wall is yet in sight. Other parts of the mine also show good bodies of gold-bearing stone. A start has been made erecting the battery.

The Stannary Wills has struck very rich ore in the face of the drive at the 265-ft. level of the Ivanhoe shaft. The drive is now 40 ft. through ore, the width of the lode where cross-cut being 8 ft.

South Australia.—H. Y. L. Brown, the Government Geologist, has sent in his report on the Winneck's gold-field, Centralia. Of the Reward Claim he says there are large irregular quartz reefs, from which gold can be dollied out, the gold occurring in iron stone, gossan and cellular quartz, and in bunches and crevices, but the proportion of this auriferous stone is very small, and the quartz itself contains very little gold. From the character of the country rock (decomposed gneiss and dyke matter), he thinks the reefs will prove as irregular below as on surface. Some of the gold discoveries promise to be of importance when properly opened, and there is every reason to expect that a payable gold-field will, in course of time, be developed. Though the workings are shallow and the field is in its early prospecting stage, share brokers look upon the report as hopeful. Capt. Pleitner, who has just returned from the field, considers the rush unwarranted, and that the people there think only of booming the field. He has a better opinion of the White Range field, 30 miles east.

Perth, W. A. April 13.

(From Our Special Correspondent.)

The Great Boulder Proprietary Company says that prospecting work with the diamond drill at Jenning's shaft on the 600-ft. level has shown ore 10 ft. wide, 280 ft. north of the Ivanhoe boundary, and 1,335 ft. from surface. The assays average $25 per ton.

As a further proof that the main ore-bodies of the field maintain their values to considerable depths—this is one of the most important developments announced for some time.

The Boulder Block 280 lies north of the Ivanhoe, and the Ivanhoe East lode has been already tested at three levels higher in the Boulder Block, but was not found to be payable. The lode has now been picked up north of the Ivanhoe, and about the center of the Boulder Block 102, thus giving plenty of length to follow the course of the lode. The Ivanhoe Company is cross-cutting at 500 ft. level for the lode, and the Boulder Company proposes sinking a new shaft on Block 280, at the point where the bore cut the lode.

Much interest has been evinced by Mr. Hamilton's report on the South Kalgurli Mine, which has been followed by Mr. Ile's resignation as manager. Mr. Hamilton recommends the entire remodelment of the mine's ore reduction plant, at a total cost of £14,350, to reduce the present high cost of treatment, also the installation of Merton roasters, and the abandonment of the three Brown straight-line furnaces, but says nothing about the Riecken extraction process, which is undoubtedly a complete failure. Mr. Hamilton thinks, with his recommendation carried out, a profit of £1 2s. 3d. ($5.40) per ton would be shown, or on a basis of 100 tons per day, £40,000 per annum.

Mining in nearly all parts of West Australia's vast fields show a steady advance in spite of the complete stoppage of new company production. In fact, the scarcity of capital has done much to force prospectors and owners to try to make payable returns instead of sitting down and wait for a buyer. Many prospectors have made use of the Minister for Mines' offer to loan camels, and during the past few weeks a number of well-equipped parties have started out in the back country, so before long we may reasonably expect to hear of new finds. Meanwhile, the older mining districts continue to attract some attention. A party at Bulong last week struck a rich pocket, yielding over 1,000 oz. of gold.

The recent "boom" in South Australia has drawn many old hands to Arltunga, but the latest reports are less sensational, and it is recognized that the "hills of gold" will prove big low-grade formations of some value, but so far from any center as to prevent extensive working, though they will assist South Australians in getting the Northern Trunk Railway taken up.

The State Mining Engineer, Mr. Montgomery, has just been to the Warren River Oil District. If his report is favorable the Government has promised a subsidy of £1 for £1 to the syndicate now boring there, in order to enable it to bore to 2,300 ft. So far the indications are favorable.

The Phillips River copper and gold field has recently had fresh attention from the report of the State Mining Engineers' basis. At present this promising field suffers from difficult transport and lack of local smelting facilities; all the richer ores being sent to the Eastern States. The report estimates the total cost of carriage, treatment, etc., at about £7 per ton, and therefore high-grade ores only pay to ship.

Auckland, N. Z. April 15.

(From Our Special Correspondent.)

Gold Dredging.—On the southern part of New Zealand dredge mining has settled to a permanent basis. The majority of the dredges are obtaining payable returns, and most of the claims now worked have been adequately tested. Till recently there has been such a demand for dredge masters that though a supply has never been lacking, the quality often was poor, so that many dredges have been in charge of comparatively untrained men, and what might have been a payable claim under proper management was forced into untimely liquidation. All dredge masters are now required by the New Zealand law to hold certificates, which in future can be gained only after passing a written examination. Two years' practical experience on dredges is also required.

Hauraki Gold-field.—The returns from the Ohinemuri section continue good, but at Thames and Coromandel the mining industry languishes. During the past month the chief returns were: Waihi, £52,707 ($263,535) from 17,447 tons, equal to £3 3½d. ($14.67) per ton; Talisman Consolidated, £6,814 ($34,070) from 3,280 tons, with working expenses of £1 6s. 6d. ($6.41) per ton; New Zealand Crown, £5,797 ($28,985) from 2,916 tons; Komata Reefs, £2,500 ($12,500) from 1,020 tons; Tairua Broken Hills, £2,030 ($10,150) from 600 tons.

Diamond Drill Boring.—There are signs that boring will be done on the Hauraki field in the near future. The proposals at the Thames still hang fire, but the Woodstock Company at Karangahake is already boring an inclined hole with the expectation of striking the Crown reef, while the Waitekauri and Waihi Consolidated companies have both decided to put down a series of boreholes, the former to test the reef at a lower level, the latter to determine the country underlying the barren flows of rhyolite which cover the greater part of its property.

GENERAL MINING NEWS.

Chesapeake & Ohio Railway Company.—Shipments of coal and coke in March and the nine months of the fiscal year, beginning July 1, 1902, were as follows, in short tons:

Coal:	March.	Nine mos.
New River	324,585	1,570,458
Kanawha	149,955	806,866
Kentucky	13,436	92,024
	487,976	2,469,348
From connections	17,327	135,506
Total coal	505,303	2,604,854
Total, 1902	521,652	4,324,377
Coke:		
New River	43,218	225,137
Kanawha	14,656	58,332
	57,874	283,469
From connections	.....	2,266
Total coke	57,874	285,735
Total, 1902	48,122	362,663
Grand total, 1903	563,177	2,888,323
Total, 1902	569,774	4,687,040

Decreases in the present fiscal year are 1,719,523 tons, or 39.8 per cent in coal, and 76,928 tons, or 21.1 per cent in coke; owing principally to smaller shipments to tidewater points.

ALABAMA.

CALHOUN COUNTY.

DeSoto Gold Mining Company.—This company was recently incorporated to develop mining property at Jackson Shoals on the Coosa River. Its capital is $300,000; the incorporators are W. M. Taylor, H. D. Barr, H. H. Constantine and John L. Dodson.

ALASKA.

(From Our Special Correspondent.)

In Forty-Mile District, particularly about Chicken Creek, an exceptional heavy clean-up is expected. The bench claims have yielded better than ever before. It is thought a couple of thousand claims will be liable to re-location next January.

CAPE NOME.

(From Our Special Correspondent.)

The Nome Exploration Company, Pioneer Mining Company and Miocene Ditch Company at Nome are to put in large hydraulic plants this season. Oil from California is to be used as fuel.

Alaska Commercial Company.—This company has disposed of its mercantile business at Nome and its warehouses at Chinik, Golovin Bay, intending to confine its business to Dawson and Yukon River points, except at St. Michael, its principal shipping station.

ARIZONA.

COCHISE COUNTY.

Arizona Copper Company.—The output of copper at Clifton in April was equivalent to 1,342 short tons.

Black Diamond Mining Company.—At a meeting of the stockholders held at Wheeling, O., the following directors and officers were chosen: E. D. Kennedy, president; Dr. T. M. Sabin, secretary, Warren, O., Henry Christy, vice-president, Cleveland, O., Mr. Hoffman, Wheeling; N. O. Bagge, general manager and treasurer, Black Diamond, Ariz.

ARIZONA.

YAVAPAI COUNTY.

American Copper Company.—The property of this company, known as the Iron King Mine, consists of about 400 acres, near Val Verde. It is developed by three shafts of 260, 170 and 100-ft. depth, sunk along the ledge and connected by 1,200 ft. of drifts. The company has under construction a 6-stamp mill, Joshua Hendy make, and a cyanide plant, consisting of crusher rolls, and leaching tanks provided with piping as for the pneumatic cyanide process. Ben Blanchard manager, has a large force at work on the mill, and is sinking a new 3-compartment shaft.

Braganza Gold Mining Company.—This company, under P. A. Johns, superintendent, is operating the old Henrietta mine and mill at Big Bug Gulch. The property, consisting of five claims, is developed by about 7,500 ft. of work, chiefly laterals, and a 300-ft. shaft below tunnel level. A 1,500-ft. surface tramway line runs from the lower workings to the mill at the foot of the hill. The mill consisting of 20 stamps, amalgamating plates, and concentrating tables is reported making a good saving.

Model Mining Company.—This company is working the old McCabe Mine in the Chapperal District, L. W. Felt superintendent. The main shaft, 700 ft. deep, is being sunk to 1,000 ft.; station pumps on the 300 and 600-ft. levels, handle the water. The company operates a 10-stamp mill, with plates and tables at the mine, and also another mine and mill 14 miles south of Kirkland. The output of the McCabe Mine has been about 70 tons daily.

The McCabe plant, consisting of a 10-stamp mill, hoist and auxiliary machinery, has been according to report, almost completely destroyed by fire. The loss is estimated at $25,000.

Senate Mining Company.—This company is developing 10 claims, near Congress. O. F. Underwood is president; S. Percy Hooker, secretary-treasurer, both of Le Roy, N. Y.; C. H. Akers, of Phœnix, and J. W. Akers, of Prescott, superintendent. On the property is an incline shaft of 500 ft., with laterals on the 100, 200 and 300-ft. stations.

CALIFORNIA.

AMADOR COUNTY.

Baliol.—This mine, at Sutter Creek, owned by the Western Gold Mining Company, is being examined for London and Boston people. It has been closed over a year.

Emmons.—The old shaft, at Pine Grove, has been repaired and some ore taken out.

Rhetta Consolidated Mining Company.—This company, John Ross., Jr., manager, controlling the Bay State, Rhetta and Kretcher mines at Plymouth, has issued more stock to develop the properties.

BUTTE COUNTY.

Little Hope.—This mine, near Merrimac, is to be reopened and worked, under Joseph Daggett.

CALAVERAS COUNTY.

Easzy Bird.—The mill of the Paragon Mine, at Railroad Flat, is being moved to this mine at Mokelumne Hill.

Golden Mining Company.—This mine, at Vallecito, is still in litigation. The directors have been made defendants in a suit to declare null and void the sale under assessment of 12,447 shares of stock. The directors have filed a petition to dissolve the corporation.

ELDORADO COUNTY.

Eldorado Copper Mining Company.—This company, J. A. Parker, superintendent, will shortly put men at work on the old Eureka quartz mine in Georgetown, and at the Ford copper mine, near the same place.

Landecker.—This old gravel mine, near Chili Ravine, is being reopened under Foreman Thomas Swansborough.

Zimmerman.—Work is to be resumed with 25 men on this gravel claim in Pacific District.

INYO COUNTY.

Ratcliffe.—From this mine, near Ballarat, the International Equipment Company announces the receipt of 223 oz. of gold from its April run.

KERN COUNTY.

Angelus.—This mine, 18 miles from Randsburg, E. S. Wilson manager, has been sold to Colorado men and a larger force will be put at work.

Tekla Mining Company.—This company has been organized at Kern to work 4 claims 22 miles from Caliente, in Amalie District. A. J. Hendersol is president; R. E. Frain, vice-president; H. C. Jones, secretary, and L. T. Henderson, treasurer.

MARIPOSA COUNTY.

Farmers Hope.—This mine, at Whitlock, owned by J. J. Ellingham, has a 5-stamp mill at work. The mine has been bonded to E. Walters & Sons.

Hayseed.—This mine, at Whitlock, owned by William Dolph, has a shaft now down 285 ft., and is producing good ore.

Triumph.—This mine, near Whitlock, operated by J. M. Helm and C. Czerny, is producing some beautiful gold specimens.

MONO COUNTY.

Crystal Lake Company.—The upper works of this company, at Lundy, R. T. Pierce superintendent, are temporarily closed. The men are advancing the lower tunnel as fast as possible.

Sweetwater Mining Company.—This property, near Bridgeport, J. A. Brown superintendent, has been worked all winter, and 235 ft. of tunnel have been completed on contract. Machinery is to be added to the mill, and a cyanide plant. Some high-grade ore has been taken out lately.

MONTEREY COUNTY.

Manchester.—On this claim, at Los Burros, S. O. Pugh & Co., are running a drain tunnel.

Ralston Mining Company.—Local papers announce the finding in one of the placer claims of this company, in Los Burros District, a nugget weighing 35.25 oz.

NEVADA COUNTY.

Allison Ranch.—The Weissbein Brothers deny the rumor that they intend acquiring this old mine, at Grass Valley.

Black Bear.—The 2-stamp mill of this mine at Rough and Ready, William Torpie superintendent, has started.

Boss.—This mine, at North San Juan, owned by Page, Harding and McCutcheon, of San Francisco, is being examined with a view to purchase by Los Angeles men. It is a low-grade proposition.

Champion Mining Company.—This company, at Nevada City, has elected the following officers: Joseph Fetz, president; I. Rosenthal, vice-president; B. N. Shoecraft, secretary, and E. R. Abadie, superintendent.

Coe.—This mine, at Grass Valley, C. B. Lakenan superintendent, is showing good ore on the 1,000-ft. level. There is said to be no truth in the rumor of a suspension of operations.

Erle.—A larger crew is to be put on this claim, near Graniteville, under bond to George Levinsky.

Gold Tunnel.—Excavating has started for the mill foundations at this mine at Nevada City.

Gray Eagle.—This mine, at Maybert, owned mainly by S. T. Allen, E. R. Healey, M. O. Reilly and J. F. Littlefield, has its 10-stamp mill nearly completed. The company owns a ditch for water power. Fifteen men are employed under Superintendent H. Kaler. J. F. Littlefield is general manager.

Ocean Star.—This claim, at Ormonde, will shortly start, after being idle some time, and the tunnel will be advanced. The mine is owned by W. D. Cooley, and is under bond to the Red Cross Company.

Pine Hill.—At this mine, 14 miles from Auburn, 25 men are at work under Superintendent Rosenthal.

St. Gothard.—A new steam pump for this mine, near Columbia Hill, has been delivered at the railroad station.

South Idaho.—This mine, adjoining the Eureka-Idaho-Maryland vein at Grass Valley, has been started up by a new company.

Steep Hollow.—Plans have been made by R. D. Plummer and others for doing extensive work on this claim in Little York Township. A road is being built and new buildings are to be put up.

PLACER COUNTY.

Barton.—This mine will have a new superintendent in the person of J. L. Grimes.

Bob.—A new shaft is being sunk, and drifts run on this claim, near Auburn.

PLUMAS COUNTY.

Bellevue.—At this mine, near Gibsonville, C. B. Wingate manager, gravel has been cut in the tunnel at 5,390 ft. in. The tunnel is 8 by 8 ft., and taps the channel at the lower end of the company's property. As soon as the mine is suitably opened about 150 men will be set at work.

Continental Mining Company.—This company owns three miles of gravel channel at McRea Ridge, near the head of Nelson Creek, and will open the ground.

Lawton Mining Company.—This company owns the Blue Ball Mine, near Quincy, and is running a tunnel to tap the channel.

SANTA CLARA COUNTY.

Chapman.—The sale of this old quicksilver mine, near San Jose, to John Joyce, of Boston, and others, has called attention to a number of quicksilver prospects, both in that and San Benito County, which only need capital to make producing properties.

Phoenix Quicksilver Mining Company.—This is the new company organized to work the quicksilver mines in Red Mountain District. The property consists of the South Summit, Hayward, Grayson, Martin, North Summit, White Oak and Hopkins quicksilver claims.

SHASTA COUNTY.

Detroit & California Mining Company.—This company's dredge at Clear Creek, T. R. Heintz manager, has made its first clean up.

Hidden Rock.—A rich pay streak has been found in this mine in Old Diggings District by John Lanyon, the owner. There are two prospect shafts on the property.

Jennings.—A group of iron ore claims owned by R. J. Jennings on the McCloud River, 16 miles from Baird Spur, is about to be opened.

Midas Mining Company.—On the 700-ft. level, at the bottom of the shaft, at Knob, a rich ore shoot has been struck, supposed to be on a ledge distinct from those in the upper workings. The Midas is one of the largest gold producers in this county.

SISKIYOU COUNTY.

Advance.—Thomas M. Donald and others are inspecting with a view to purchase this mine in Liberty District. Several other mines in that district have recently been bonded, notably the Ball, the Evening Star and the Central.

Greenhorn Blue Gravel.—This mine, near Yreka, owned by J. W. Williams, with John Garvey as superintendent, is being pumped out, and will be retimbered. Electric power is to be used.

Jillson.—This mine, at Henley, owned by the Hazel Mining Company, is now worked by a large force, and the mill runs steadily.

TRINITY COUNTY.

Brown Bear.—On application for a winding up of the affairs of the partnership owning this mine, the court has issued a decree dissolving the partnership and ordering the mine sold. Charles Dobler, the superintendent, will be appointed receiver to sell the mine.

Globe.—Superintendent R. A. Skinner of this mine, at Dedrick, says that the road is completed, air compressor house finished, and everything ready for the new machinery.

Lappin.—The first payment on this mine, at Deadwood, has been made by the J. J. Chambers Company, which has it under bond.

TUOLUMNE COUNTY.

El Rico Mining Company.—This company has been organized in San Francisco to work the Bell Mine at Tuttletown, which S. D. Woods and W. J. Rule have been working. T. S. Bullock is president; S. D. Woods, secretary and treasurer, and W. J. Rule, superintendent. They expect to put in an air compressor and a 10-stamp mill.

Keltz.—Work is to start at once on this mine, near Sonora, which at one time was a good producer.

Mount Jefferson.—In this mine, at Groveland, the mill continues to crush about 60 tons of ore daily, and the cyanide plant is busy.

Sierra Gold Mining Company.—At this property, at Groveland, J. F. Giles manager, the new hoist is about completed, and sinking will be resumed.

VENTURA COUNTY.

Schloss Quarry.—At this sandstone quarry, near the town of Camarillo, 250 men are employed. The rock is crushed and used for railroad ballast and for harbor improvement work. As soon as the Santa Susana Tunnel is completed 100 more men will be put at work.

John Curry.—The 320 acres in this tract on the south side of the Yuba River, near Marysville, have been purchased for dredging.

YUBA COUNTY.

Sebourg & Davis.—L. H. Mitchell and Frank E. Wright, with others, have bought this mine and mill, near Rackerby, the old Spanish, and 13 other claims near there. The quartz properties cover about 500 acres. The mill, with a capacity of 60 tons daily, will soon be at work, and when development warrants another mill will be built.

COLORADO.

BOULDER COUNTY.

The expected strike in the northern Colorado coal field was declared off recently, owing to the miners withdrawing their demand for an 8-hour day.

CLEAR CREEK COUNTY.

Cedar Ridge Mines and Tunnel Company.—This company, recently incorporated, will work a group of six claims on Santa Fe Mountain, near Idaho Springs. The capital stock is $120,000, and the incorporators are: W. A. Kaip, of Mt. Pleasant, Pa.; J. D. F. Pierson, of Kenton, Mich.; J. M. Sterling, of Bridgeport, Conn.; and Dr. P. M. Egart, of Holland Patent, N. Y.

EAGLE COUNTY.

Black Iron.—John F. Fleming, of Red Cliff, has purchased the lease on the Black Iron, Cleveland, Little Topsy, Morgan and Jenny Lind claims at Bell's camp from Messrs. Farnum, Smallwood, Larson and Turnbull, who have been working them for several years. The property is said to contain large bodies of manganese iron ore, for which Mr. Fleming has

contracts for all that can be shipped. The ore will go to the smelters at Salt Lake. It is expected the daily output will be from 50 to 60 tons.

FREMONT COUNTY.

United States Reduction and Refining Company.—This company, of Florence and Colorado Springs, is removing some of the machinery from the old Metallic cyanide plant, at Cyanide, to Canon City, for use in the construction of the new smelter. The Metallic property, at one time the best equipped and largest mill in the valley, may never be worked again.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

Clear Creek Mining and Reduction Company.—It is expected that the smelter at Golden will start about June 1. The company intends to erect a refinery of its own, to be independent of the American Smelting and Refining Company. The smelter has ore enough on hand for several weeks, and will not receive any custom ores for some time. F. R. Carpenter, Golden, is manager.

Delmonico Mining Company.—This company is building a 25-ton concentrating and amalgamating plant on Quartz Hill, the new building being 32 by 45 ft., and connected with the main shaft building. The machinery is furnished by the Tetault Iron Works, of Denver, and includes two Tetault mills, which crush the ore. The dirt passes over copper tables to bumping tables, and then to the Tetault concentrating tables. Louisville, Ky., and Denver men are interested, and during the past year have sunk the Delmonico shaft from 300 to 1,300 ft., the ores below the 1,000-ft. point being especially good. Shipments of smelting ores to Denver smelters have given values of over $100 per ton, and the milling ores have been above the average. The company has money in its treasury and proposes to sink to 1,500 ft. E. Steffan, Central City, is superintendent.

Foote & Simmons Mining Company.—This company has its main shaft in good shape down to 600 ft., and has been cleaning out the various levels, and exploring the property. Shipments of milling ores returned between 2 and 3 oz. gold per cord, with the tailings selling for $20 to $25 per ton, the smelting ores average $50 per ton. The company contemplates putting in an 8 by 10 friction hoist, and 80-h.p. boiler. Eastern men are interested with Sam Mellor, Black Hawk, in charge.

Gladstone.—John Bruhl, of Central City, one of the owners, is working this property in Illinois Central District, and has made a shipment which gave values of 12 oz. gold, 18 oz. silver and 20 per cent copper.

Kemp-Calhoun.—Manhire Brothers, Russell Gulch, who are working under a lease and bond, have shipped a car-load to the Argo Smelter, which brought values of $250 per ton. They are sinking and have a smelting streak from 10 to 12 ins. wide, showing yellow copper, galena and blende.

Northwestern Colorado Exploration Company.—This company operating the Benton property has installed a new hoisting plant. It has shipped from surface workings to the Perigo Mill. Pittsburg, Pa., men are associated with Coloradoans. W. H. Knowles, Majestic Building, Denver, is manager.

Saratoga.—In this property, owned by Detroit, Mich., men, a good strike is reported, the ores running between $700 and $800 per ton, principally in gold. E. R. Nelson, Russell Gulch, is superintendent.

HINSDALE COUNTY.

Hinsdale Mining and Milling Company.—This company was incorporated recently at Paterson, N. J., with a capital of $1,000,000. The incorporators are Gould H. Taylor, James J. Donnelly, Charles H. Merseneau, William Van Wagoner, Walter J. Allen, Edmund G. Staller and Robert E. Busted, all of New Jersey. The purpose of the concern is to acquire and develop the T. C. M. group of claims.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Leadville Ore Shipments.—Shipments of all classes of ores are up to 2,600 tons per day.

Leadville Zinc Production.—The zinciferous ores are being handled in larger quantities than ever, and several mills are figuring on increased capacity. Over 450 tons daily of crude ore are handled by the various mills.

Amity.—Local people are operating this St. Kevin property, on which a good body of silver lead ore has been encountered. A recent shipment of 75 tons averaged $100 per ton.

Benton.—On this property, in Adelaide Park, a fine body of copper sulphides is being developed, and 15 tons daily are shipped to the Buena Vista Smelter.

Big Four Mining Company.—At the annual meeting the old officers were re-elected headed by J. J. Case, of Freeport, Ill., as president. The company is not doing any work, but its lease to the Gold Basin Company yields good royalties.

Bon Air.—T. S. Schlessinger has opened at the 540-ft. level a fine body of lead carbonates. Two carloads just shipped show material that will assay $1,000 to the ton.

Bug Gold Mining Company.—Milwaukee men interested have been here at the annual meeting. The reports of Manager Dewey were considered favorable, and it was decided to resume work June 1. The 200-ft. shaft is to be sunk 400 ft. The new directors are Julius Rocher, F. L. Horneffer, J. S. Phippeny, Eugene F. Yahr, all of Milwaukee, and W. P. Dewey, Leadville. Mr. Dewey is also manager.

Catalpa-Crescent.—Besides making steady shipments of oxidized and manganese iron, Lessee McGreavy is cleaning out the lower levels at 600 ft.

Twin Lakes Placer Mining Company.—Extensive development is planned by this European company, and Manager N. A. Loggin, who has just returned from London, is putting on a big force of men.

Diamond Gold Mines Company.—A remarkable oxidized body is being opened. The new machinery being installed will enable the company to increase shipments to 125 tons a day.

Elkins Mining Company.—On the New Year's Mine, in Dewey section, this company has opened three veins at 200 ft., all showing good ore, and has also 6 ins. of rich ore in the Yankee Blade new shaft.

Fortune.—James McNeece, the owner, has opened one of the richest strikes made on the gold belt in years. One car of ore shipped last week netted $15,000. Operations are pushed.

Gold Basin Mining Company.—The management is stoping on the vein.

Greenback Mining Company.—It is rumored that a new contract will be made with the smelters, and that the Greenback will start up, but Manager Mulrooney and others interested state the report is without foundation.

Iron-Silver Mining Company.—There is some talk of enlarging the Moyer Mill to handle more zinc ores. The Moyer shaft is shipping regularly 300 tons daily.

New Leadville Home Mining Company.—Shipments have been increased to 250 tons daily of good grade iron ore, and several large stopes are being opened in the north end of the property.

Ibex Mining Company.—Shipments average 250 tons daily, of oxidized and siliceous ores. Much new work is under way, the most important being the sinking of the shaft to connect with the Yak Tunnel at Ibex No. 4. The shaft will be completed by July 1. Much new work is planned.

New Zinc Mill.—Plans are being altered for the new plant to be built by Kansas City people. It will be the algest zinc mill in the district, and will do custom work as well as treat the zinc sulphides of the Yak. It will be completed late in the year.

Valentine Mining Company.—William E. Hawks, representing the Eastern owners, is looking over the property. No valuable ore has yet been encountered.

SAN JUAN COUNTY.

Cleveland.—This tunnel is being cleaned out and retimbered, and will be developed on a large scale during the summer.

Evans Group.—This group is to start up soon with a large force and new equipment.

Green Mountain Mining and Milling Company.—The tunnel is now in 500 ft., and recently uncovered a blind lead of good concentrating ore. The objective point is the International vein.

North Star.—The 110-ft. shaft, near Silverton, has been drained and drifting resumed on the vein.

Philadelphia.—The owners of these claims, near Silverton, have secured adjoining property, and now own 16 claims, which will be tapped by a 3,000-ft. tunnel during the summer.

Rockwood River Company.—This company has arranged to furnish electric power to the Silver Lake Mill during the winter.

Shenandoah.—This Silverton property is worked under lease by A. S. Sturgeon, but will be developed by the Contention Mining Company as soon as the lease expires. Rich ore is mined by the lessees, and the Animas Mill will treat the log-grade product.

Sunnyside.—A strike of the cooks and waiters, indorsed by the Miners' Union, has caused a shut down. All the men employed at the mine and mill were paid in full. It is said that at present there is but little prospect for a settlement. J. H. Terry is owner of the property and J. Terry superintendent.

TELLER COUNTY.

Portland Gold Mining Company.—The Stearns-Rogers Manufacturing Company has brought suit against this company in the United States Circuit Court to collect $54,045.67 alleged to be due on construction of the Portland chlorination mill. The money is alleged to be due on several contracts. A part of each of the total amounts has been paid, but the complaint states that a part of each yet remains unpaid and uncollected. The manufacturers were to furnish the plans, provide a superintendent for construction and to furnish certain parts of the material used. For the furnishing of plans and supervising of construction the manufacturing company was to get a certain per cent of the total cost. The entire works are alleged to have cost about $700,000, the manufacturing company furnishing about $112,772 of one kind of material and $52,383 of another kind. There is charged to be due $24,991 of the percentage for plans and construction, the balance of the amount sued for being on the material furnished. The objection of the Portland Company to paying the claim, has not been made public, though it is understood to be faulty construction of the mill and non-fulfillment of contract.

GEORGIA.

LUMPKIN COUNTY.

Crown Mountain Gold Mining and Milling Company.—This company, at the annual meeting recently at Dahlonega, elected these directors: Gen. Warner, Mr. Merrick, Col. Moore, Mr. J. F. Moore, Mr. Donovan, Mr. Rogers, Mr. Frederick N. Sinks. A report submitted by the president showed that the affairs of the mine were in a prosperous condition, large bodies of ore being available. Arrangements were also made for completing the Gorge dam, and for the erection there of a plant for the generation of sufficient power during the dry season.

IDAHO.

BOISE COUNTY.

Badger.—This company, at Quartzburg, will erect a mill on its Bull of the Woods Mine.

SHOSHONE COUNTY.

Empire State-Idaho Mining and Development Company.—Arguments have been heard in San Francisco, Cal., before the United States Circuit Court of Appeals on the actions between this company and the Bunker Hill & Sullivan Mining and Concentrating Company. The titles of the four actions of appeal are as follows: Empire State-Idaho Mining and Development Company vs. Kennedy J. Hanley; Charles Sweeney and F. Louis Clark vs. the Empire State-Idaho Mining and Development Company; Sweeney, Clark and Empire Company vs. Kennedy J. Hanley, and Empire Company vs. Bunker Hill and Sullivan Mining and Concentrating Company.

ILLINOIS.

(*From Our Special Correspondent.*)

Following is the committee appointed by the executive boards of the Illinois Coal Operators and Miners to investigate the question of shot-firers at the mines of the Maplewood Coal Company and Newsam Brothers, at Farmington, and Howarth & Taylor, at Edwards: Charles Schuler, of Davenport, Ia., operating mines at Gilchrist and Wanlock, Ill., and Edward H. Coxe, of Springfield, Ill., general superintendent of the Jones & Adams Company, representing the operators, and J. J. Wilson, of Peoria, and Peter McCall, of Glen Carbon, representing the miners. The committee met at Peoria, May 12, and spent two days examining the miners, but failed to agree, the miners' representatives claiming that shot-firers were necessary, and the operators the opposite. They will submit separate reports.

Pittsburg Coal Company.—This company, of Pittsburg, Pa., has purchased the mines of the Sorento Coal Company, at Sorento, and the Virden Coal Company, at Virden, and has gained control of the Chicago-Virden Coal Company, with mines at Virden, Auburn and Chatam. It is trying to get some mines in the Danville and Springfield districts.

IOWA.

MONROE COUNTY.

(*From Our Special Correspondent.*)

Consolidation Coal Company.—This company controlled by the Chicago & Northwestern Railway, is opening two new mines, No. 11 and No. 12, in this county, and extending the tracks to them.

Hocking Coal Company.—This company, E. S. Laughlin, Oskaloosa, general manager, operating mines at Hocking, 2 miles southwest of Albia, on the Iowa Central Railway, is going to open another mine at once. It is also talking of equipping one of its present mines with electric haulage.

Miller Creek Coal Company.—J. S. Jones, of Chicago, president, and Edward H. Coxe, of Springfield, Ill., mining engineer, of this company, together with Frank A. Ray, of Columbus, O., professor of mining engineering at the Ohio State University, have been looking over the property of the company, near Coalfield, with L. R. Rosebrook, of Oskaloosa, general manager. The company will purchase at once 700 acres of coal adjoining the present holdings and open a large mine. The Iowa Central Railway will build a branch 2 miles to reach it. The coal is 3 to 4.5 ft. thick.

LOUISIANA.

ACADIA PARISH.

(*From Our Special Correspondent.*)

Chicago-Jennings Oil Company.—The well on the

Garroud tract at Jennings is down 1,100 ft. Keogan No. 2 and Northern Oil Company No. 4 are also down over 1,000 ft., and should be finished in a week.

Grand View Oil Company.—This company, of Beaumont, has purchased two acres of land at Jennings, and will start drilling at once.

Jennings Oil Field.—Crude is selling at 90c. per bbl., f.o.b., and shipments aggregate 700 bbls. daily. The irrigation companies are the largest buyers.

CALCASIEU PARISH.

(*From Our Special Correspondent.*)

McCormick Oil Company.—This company, capitalized at $100,000, with its office here, has been incorporated. It has leased 120 acres on McCormick Heights, and will begin to drill this week.

MICHIGAN.

COPPER—HOUGHTON COUNTY..

(*From Our Special Correspondent.*)

Coal Receipts.—Coal is being received freely at copper country ports. About 1,000,000 tons of bituminous and anthracite will be delivered before the close of navigation.

Atlantic.—Exploratory work on section 16 continues. Drifting on an amygdaloid, opened by the crosscut, is under way.

Baltic.—The output for April was 623 tons of mineral.

Calumet & Hecla.—Capt. William A. Daniell has been appointed head mining captain of the Hecla branch to succeed Capt. J. H. Wilson, resigned.

Champion.—This mine produced 525 tons of mineral in April.

Globe.—It is understood that explorations on this property, south of the Champion, will be resumed this summer. The Champion openings nearest the boundary line are rich. The property is owned by John Stanton, of New York City.

Franklin.—This mine produced 225 tons of refined copper in April. At the Junior branch the shaft is sinking to the 17th level.

Trimountain.—The April production was 580 tons of refined coper.

Wyandot.—Operations on this property are confined to the last exploratory shaft, which is down 250 ft. Cross-cutting west from the bottom has been started. Two power drills are in commission.

COPPER—KEWEENAW COUNTY.

Cliff.—This old mine is to be dismantled. The property has been idle for many years. Its first dividend was paid in 1849, amounting to $40,000.

(*From Our Special Correspondent.*)

Ahmeek.—Cross-cutting from the bottom of the exploratory shaft continues.

Allouez.—This company has started sinking a new incline shaft to open the Kearsarge lode.

Miskwabik Development Association.—This concern which has 573 acres 5 miles north of the Mohawk, has begun exploring for the northern extension of the Kearsarge amygdaloid.

Mohawk.—Drifting north and south of No. 1 shaft is under way at the 8th and 9th levels. Drifts are opening north and south of No. 2 shaft at the 7th and 8th levels. South from No. 4 shaft some good ground has been opened. The mill is stamping 915 tons of rock daily.

COPPER—ONTONAGON COUNTY.

(*From Our Special Correspondent.*)

Mass Consolidated.—Sinking is under way in A, B and C shafts, and opening work is being pushed. Rock shipments come from the Evergreen lode mainly.

MINNESOTA.

IRON—MESABI RANGE.

(*From Our Special Correspondent.*)

Messrs. Miller, Coates, et al., have commenced drilling in section 24, T. 58, R. 17, on land belonging to Murphy, Dorr, Robinson & Flynn, and hope to find ore. The land lies near the Elba and Corsica mines, having ore of excellent quality.

Explorations have started on lands in section 24, T. 58, R. 18 belonging to Grochau, Gross and others, and one drill is at work.

Loren Fletcher and brother, of Minneapolis, who have been exploring lands owned by them on the western end of the range, are said to have found a fair-sized body of merchantable ore in the northeast quarter of the northwest quarter of section 28, T. 56, R. 24, about 7 miles northeast of the Mississippi river and near the Hartley, Holman and Diamond properties. If reports are true, this is the most westerly find of good ore on the Mesabi.

Pitt Iron Company.—This company, which bought the Longyear Mesaba Land Company's property in section 4, T. 58, R. 15, where Miller, Eaton and others found some 2,500,000 tons of ore, is sinking a working shaft, and will mine a little ore this year. The royalty to the Pitt Company is 35c. a ton and the minimum is 50,000 tons a year. Adjoining this land to the south some of those who found the ore are looking for an extension of it.

Commodore.—No. 3 shaft of this mine, down 140 ft., is being repaired, and will be deepened and connected with the ore by drifts. At the other shafts of this mine shipping is in progress and the year's output will be large, fully 500,000 tons.

Cook County Mining and Land Company.—This company is said to have the ownership of 1,600 acres of land, claimed to be mineral bearing, in Cook County, and some stock is being sold in Duluth at 15 per cent of par. There is some casual exploration for iron ore in the county, but nothing of consequence has been found so far as can be learned.

Shenango.—Shipments from this mine, of the Shenango Furnace Company, have started, and will be quite rapid. The mine has an annual minimum of 100,000 tons on a 20c. royalty, and contains nearly 10,000,000 tons of excellent ore. The Shenango Furnace Company paid $450,000 bonus for the lease and got a bargain. The Chandler Iron Company had an option for a bonus of $150,000 immediately before the mine was taken by the Shenango Company, and contrary to the advice of its practical men dropped the option.

Standard Mining Company.—This company has taken an option on the Buckeye property, in section 36, T. 56, R. 25, and will explore there. The tract has been explored several times. It contains ore of a sandy character.

IRON—VERMILION RANGE.

(*From Our Special Correspondent.*)

Minnesota Iron Company.—This company is drilling on a part of the famous section 30, and may put on several drills. The company has a lease of all the interests in what is known as the "Warren 80," aside from the interests comprising nearly the whole it holds in fee. The Warren 80 is practically the north half of the southwest quarter, and the work of the Section 30 Company is directly north.

Oliver Iron Company.—Within a space of about a mile this company is sinking the four biggest shafts it has in the Lake Superior region. The deep incline shaft of the Pioneer is 3-compartment and steel-lined. Next to it a vertical shaft for the Zenith is going down rapidly, then comes the enormous steel shaft house of the Sibley Mine, over a very deep shaft, and further east is another steel head frame over the great shaft of the Savoy. These two shaft houses are about 160 ft. high, all of steel. It is proposed to erect such shaft houses at the Pioneer and Zenith shafts, each to be equipped to hoist.

MONTANA.

BEAVERHEAD COUNTY.

Ajax Mining Company.—This company, incorporated at Dillon, is capitalized at $1,000,000 in $1 shares. $250,000 now in the treasury. The Ajax Mine is situated at the head of the Big Hole basin, on Swamp Creek. It has been a gold producer for 20 years.

CASCADE COUNTY.

Lockray.—Work has again been suspended in these coal mines at Sand Coulee; no explanation is given.

FERGUS COUNTY.

Gold Reef.—This mill at Gild Edge, is reported closed until the roasters being installed are ready. Mr. McCormick is manager.

MADISON COUNTY.

The new mill at Rochester is about finished. About 15 men will be employed.

Bismarck-Nugget Gulch Mining Company.—This company is doing extensive work upon its properties near Sheridan. Toledo Mine No. 2 has been unwatered, and a station is being cut at the 150-ft. level. The new mine machinery has been proven satisfactory, while the machinery for the new power plant is on the ground, construction is being pushed rapidly. The Brandon concentrator is being enlarged to 100 tons daily capacity. Mr. McCall, president of the company, is at the mine.

Red Bluff.—This mine, at Red Bluff, which has been idle for years, is again in operation, 40 men being employed. The 100-ton concentrating plant is also running. Frank C. Lacompany is manager.

MISSOULA COUNTY.

Copper Cliff.—Francis T. Homer and W. B. Tilden, of Baltimore, Md., representing a Baltimore syndicate, are in Montana to close a deal for this mine, 25 miles east of Missoula.

SILVER BOW COUNTY.

Amalgamated Copper Company.—The annual meeting of this company is announced for June 1, in Jersey City, N. J. Proxies are in the names of H. H. Rogers, F. P. Olcott, A. R. Flower and William G. Rockefeller.

NEBRASKA.

DAKOTA COUNTY.

Inter-Mountain Coal Company.—This company, incorporating at Lincoln, Neb., it is said, has taken over mineral leases on 4,000 acres of land near Jackson, and intends sinking a shaft to tap a vein of coal at about 275 ft.

NEVADA.

NYE COUNTY.

(*From Our Special Correspondent.*)

At Attwood, 35 miles north of Luning and 80 miles northwest of Tonopah, a mining district has been organized and named Fairplay. Wood is plentiful, but water not. A number of ledges have been discovered carrying gold and copper, but there are as yet no mills. The ore so far found is reported high grade.

NEW JERSEY.

MORRIS COUNTY.

Hibernia.—Work is being pushed in the mines, and additional men are being put on. The ore-crusher, which has been run on the day shift only for some time, is now run on the night shift also.

SUSSEX COUNTY.

The old Grinnell Burt limestone quarry, near McAfee, has been sold to the Bethlehem Steel Company, of South Bethlehem, Pa. Arrangements are being made to operate the property on an extensive scale.

NEW MEXICO.

SANDOVAL COUNTY.

(*From Our Special Correspondent.*)

By recent act of the New Mexico Legislature a considerable portion of Bernallilo County has been cut off and made into the new county of Sandoval. The western Ortiz, San Pedro and Sandia mining districts are now located in Sandoval County.

Three miles from Hagan the Frank Brothers, of Denver, are boring for oil. The drill is now down about 800 ft.

Since the new branch line of the Santa Fe Central Railroad has been located, up the San Pedro Canyon, a large number of mining claims have been located in that district, and prospecting is active.

Golden Mining and Milling Company.—This company has decided to put in a 40-stamp mill to handle the ores of its principal mines near Golden. The water question, heretofore serious, apears to have been overcome. J. G. Mayo is manager.

Industrial Gold Placer Company.—This company is preparing to resume under new management. New machinery of special design has been built in Boston, and will be installed. W. J. Savage, of Boston; Governor Stearnes, of Rhode Island, and several other of the heaviest stockholders recently visited these properties. For some time the company was handicapped by lack of sufficient water, and three 10-in. wells were sunk to a depth of 800 ft., and finding good flows of fine water. F. Moore is superintendent.

Monte Cristo.—This gold placer property in Cuchillo Canyon, is again under the control of Henry Woods, and will soon resume operations.

New Mexico Fuel and Iron Company.—This company is opening coal mines at the Una del Gato and in the Pina Vititas field. Coal over 6 ft. thick is reported. In addition to the coal seam being opened, there are six other seams of coal. The new town of Hagan will soon have between 100 and 200 houses erected, and from 1,000 to 2,000 men will probably be employed. The main drift is now in nearly 1,000 ft.

SOCORRO COUNTY.

(*From Our Special Correspondent.*)

Jerome.—In the San Acacia District considerable interest is being taken in these properties. M. C. Nettleton, of Albuquerque, has the work in charge. Three shafts have been sunk and good copper ore is reported.

Socorro County Gold Mining Companyy.—This company, C. L. Herrick superintendent, is rapidly getting its plant ready. A 40-stamp mill is on the ground, and several additional car-loads of machinery are expected from Chicago. An abundant supply of water for the boiler has been obtained. The main shaft is down nearly 300 ft. The company has recently erected steel buildings for its machinery.

Sunflower Mining Company.—This company, near Estey City, with David Sanders as geenral manager, is preparing to do considerable work in expectation of the Estey City leeching plant starting up.

NEW YORK.

ESSEX COUNTY.

Ticonderoga Graphite Company.—The Rock Pond graphite mines and mill, owned by this company, have shut down. Work on the addition to the mill is still going on, and it is hoped to have the works in operation early in June. The new machinery consists of a crusher, stamp battery, buddle and dryer, which will bring the output to about two tons per day. L. B. Chism, of Keeseville, is superintendent.

NORTH CAROLINA.

JACKSON COUNTY.

Carolina Copper Company.—Negotiations between this company, of Detroit, and the Garretson Southern Furnace Company, of Cincinnati, were concluded re-

agency in Detroit, whereby the former company secures the right to erect and operate a Garretson pyritic smelter on its mine.

MONTGOMERY COUNTY.

(*From Our Special Correspondent.*)

Iola.—This gold mine is operating a 10-stamp mill day and night on ore that produces about 2 lbs. of gold every 24 hours.

Montgomery.—This gold mine, adjoining the Lola, is also showing satisfactory results.

Whitney Company.—This company, operating several mines and developing an extensive water power plant on the Yadkin River, has purchased the Russell Mine, and will equip it under the management of Col. E. B. C. Hambley.

ROWAN COUNTY.

(*From Our Special Correspondent.*)

Gold Hill.—This copper mine continues to keep the water down to the 800-ft. level, where is exposed a body of low-grade gold-copper ore.

Salisbury.—This copper mine is opening a 5-ft. vein, and has started a vertical shaft to cut the vein at 150 ft. The ore carries well in gold. The mine is owned by Salisbury people, and has caused some local excitement.

Union.—This copper mine is producing daily from the 700-ft. level copper-gold ore of good grade.

STANLEY COUNTY.

(*From Our Special Correspondent.*)

Barringer.—This gold mine, operated by the Whitney Company, is still in rich ore.

OREGON.

BAKER COUNTY.

Columbia.—A rich ore shoot is reported struck in this mine.

Golconda Extension Gold Mining Company.—Manager L. V. Swiggett, it is said, intends erecting a hoisting plant, capable of sinking to 500 ft., and later a mill.

Sunshine.—This claim, it is said, has been transferred to the Duquesne Gold Mining Company, for $11,500.

GRANT COUNTY.

Badger.—This mine, at Susanville, is reported again shipping concentrates to the smelter at Tacoma, hauling about 100 miles to Pendleton.

Olive Creek Placers.—Mr. David McCoy, superintendent, recently put on a force of men. Three giants are employed steadily.

PENNSYLVANIA.

Pennsylvania Railroad Company.—Coal and coke shipments east of Pittsburg and Erie are officially reported as follows:

	Week—May 2.	Since Jan. 1.
Anthracite coal, short tons	86,991	1,525,550
Bituminous coal, short tons	565,274	9,053,160
Coke, short tons	207,702	3,298,814
Total	859,967	13,877,524

Compared with the corresponding date last year there is an increase since January 1 of 69,824 tons anthracite, 1,044,412 tons bituminous, and 136,976 tons coke; a total increase of 1,251,212 tons, or nearly 10 per cent.

ANTHRACITE COAL.

Delaware & Hudson Company.—At the recent annual meeting, President Olyphant made a brief reference to his retirement. The following board of managers were elected: Robert M. Olyphant, Alexander E. Orr, Chauncey M. Depew, James W. Alexander, Horace G. Young, John Jacob Astor, R. Somers Hayes, Frederic Cromwell, David Willcox, R. Suydam Grant, George I. Wilber, Charles A. Peabody, Edward H. Harriman.

TENNESSEE.

BLOUNT COUNTY.

Knoxville State Company.—This company was organized recently with a capital stock of $50,000. The directors are: Gen. W. D. Hamilton, of Zanesville, O.; Joseph P. Gaut, Thomas R. Price and Capt. John M. Brooks, with the following officers: President, Gen. W. D. Hamilton, of Zanesville, O.; vice-president, T. R. Price; treasurer, Joseph P. Gaut; secretary, Capt. John M. Brooks. The company owns some 6,000 acres of slate lands on the Little Tennessee River, and it is the intention to erect a plant later on the property.

TEXAS.

GONZALES COUNTY.

(*From Our Special Correspondent.*)

Bay Shore Oil Company.—This company has finished another shallow producer at 73 ft., making the seventh in the field at Harwood. Other wells are being drilled and leasing is lively.

HARDIN COUNTY.

(*From Our Special Correspondent.*)

Star Petroleum Company.—The No. 1 well has been brought in at Saratoga, and is said to be flowing 400 bbls. daily. (This estimate is high for a 2-in. pipe.) The company is building a 37,500-bbl. steel tank and several 1,200-bbl. wooden tanks.

UTAH.

BEAVER COUNTY.

Newhouse Mines and Smelters Company.—This company, formed in New York, with a capital of $6,000,000, is to acquire from Mr. Samuel Newhouse his mining interests in this county, including the Cactus copper mines. The company will issue $1,500,000 6 per cent first mortgage bonds in addition to the entire $6,000,000 of stock. It is reported that mills and smelters capable of concentrating 1,500 tons of copper ore a day have been contracted for.

GRAND COUNTY.

Welsh-Lofftus Uranium and Rare Metals Company.—This company, recently incorporated in Buffalo, N. Y., has concluded arrangements for the development of uranium properties in the Basin District. The capital is $100,000, and the incorporators are Stephen T. Lockwood, Allerton S. Gibbs and George J. Banta. Mr. Lockwood is manager.

SALT LAKE COUNTY.

Columbia Copper Mining Company.—This Bingham company will soon erect a 60-ton concentrating mill of modern type, according to Manager Frank B. Cook, of Salt Lake City.

Four Metals Mining Company.—At the annual stockholders' meeting held recently the following directors were elected: H. H. Brandeis, Frank Severance, John Goodlett, of Omaha; D. J. Evans, G. L. Moats, of Salt Lake City; Leopold Hahn, Hastings, Neb., and Atlee Hart, Dakota City, Neb. The officers are H. H. Brandeis, president; Joseph Giles, vice-president; G. L. Moats, treasurer and general manager, and R. P. Hills, secretary. The total receipts of the fiscal year, including $979 on hand May 1, 1902, amounted to $12,995. The expenditures were $11,997, leaving a balance on hand of $998. The company intend erecting a mill on its property in Deep Creek.

New State Gold Mining and Milling Company.—The directors of this company recently awarded a contract to Fairbanks, Morse & Co., for a 50-h.p. steam hoisting plant, including 60-h.p. boiler, 10-h.p. engine for dynamo duty and complete equipment for the plant. The construction of the buildings is in the hands of Joseph Diedrich, a large stockholder in the company. The company intends sinking the shaft to the 300-ft. point before cross-cutting. The property is located 14 miles southeast of Salt Lake City between the mouths of Little and Big Cottonwood, and about 4 miles from the railroad.

(*From Our Special Correspondent.*)

Bingham Consolidated Smelter.—Three cars of copper bullion, 181,500 lbs., were shipped in the week ending May 15.

Highland Boy Smelter.—During the week ending May 15, shipments were four cars of copper bullion, 240,500 lbs.

United States Smelter.—During the week ending May 15 shipments were two cars, or 115,273 lbs., copper bullion.

SUMMIT COUNTY.

Daly West.—The management of this Park City mine has made a final settlement with those who were injured last year in the disaster at the property. Previous to the last annual meeting of the stockholders $62,729 had been expended by the company in explosion claims.

Utah Metals Company.—The zinc plant of this company, at Park City, was almost totally destroyed by fire on May 14. The loss is about $125,000, partly covered by insurance. The fire started in the bins where roasted ore was stored. Forty men are out of work.

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Stockton Shipments.—During the week ending May 15 the Ophir Hill Mine at Ophir, marketed 15 cars of concentrates, and the Stockton Mine, at Stockton, one car.

Consolidated Mercur.—Recently the directors suspended payment of dividends temporarily. This was unexpected by many, and caused much surprise. A letter sent to the shareholders explained that for several months a growing difficulty has been experienced in making a close saving of values, the average value of the tailings increasing. This is accounted for by a change in the character of the ores which have become more clayey, especially the ores developed during the past year. In several places immense bodies of talc have been encountered that cannot be leached, though the values are good. President Dern is confident that this difficulty will be overcome by the installation of the Moore process, with which some very satisfactory experiments have been made and the mill is to be reconstructed. Mr. Moore has not had his process in practical operation on a large scale, but expects to make a saving of 50c. per ton more than under present conditions.

WASHINGTON.

Coal Mining.—Owing, at least partly, to the labor troubles at Vancouver Island, B. C., mines, the mines in this State are now working full capacity. The output of the Roslyn and Carbon Hill mines is to be increased.

WEST VIRGINIA.

Col. M. Guffey, the oil operator and coal land owner, recently concluded a deal through his agents at Fairmont, for 100,000 acres of coal land in Tyler and Barbour counties, for $1,200,000. Col. Guffey, it is said, sold recently to the Wabash Railroad Company 57,000 acres of coal land in Monongalia, Preston and Marion counties, at $45 per acre, the sale aggregating $2,565,000.

M'DOWELL COUNTY.

Pocahontas Thin Vein Coal Land Company.—Mark Packard, of Buffalo, N. Y.; H. F. Runkle and Geo. E. Crane, of Kenton, O., and W. J. McClaren and James A. Henchey, of Welch, W. Va., have leased this company's property and purpose to install one of the largest plants in the Pocahontas field, and will begin work at once. Mr. Packard expects to put 200 coke ovens on the oposite side of Tug River.

WISCONSIN.

BARABOO COUNTY.

Illinois Steel Company.—This company has broken ground for a new building, in which to erect hoisting machinery for its iron mines in the town of Freedom, near Baraboo.

WYOMING.

CARBON COUNTY.

North American Copper Company.—This company is paying at its mines at Rudefeha the scale of wages prevailing at Cripple Creek, Colo., as follows: Machine men, 8 hours, $4 a day; machine helpers, 8 hours, $3.50; timbermen, 8 hours, $3.50; miners (hand steel), 8 hours, $3; trammers, 8 hours, $3; muckers, 8 hours, $3; blacksmiths, 9 hours, $4; tool-dressers, 9 hours, $3.50; carpenters (underground), 8 hours, $4; carpenters (surface), 9 hours, $4; laborers (surface), 10 hours, $3; engineers (compressor), 12 hours, $4.

FOREIGN MINING NEWS

ASIA.

INDIA.

Dharwar Gold-field.—Indian Engineering says: "The operations now being carried out in this area by Messrs. John Taylor & Sons are said to promise good results. The superintendent reports that quartz has been found in the old workings, and from the reef in places where part of the same has been left standing. Assay results prove the reef in these workings is remunerative under the present conditions. In some of the old workings the assay value is given at an ounce per ton. All the machinery from the Mysore Reefs Mine in Kolar, now closed down, are on their way to Dharwar."

INDIA—MYSORE.

Kolar Gold-field.—The gold output reported from all the mines in April was 48,271 oz. bullion. For the four months ending April 30, the total was 190,946 oz., against 161,569 oz. for the corresponding period in 1901; an increase of 29,377 oz., or 18.1 per cent. The bullion reported this year was equal to 171,851 oz. fine gold, or $3,552,160.

AUSTRALIA.

NEW SOUTH WALES.

Broken Hill Proprietary Company.—This company reports for the four weeks ending April 22 that the refinery output was 374,864 oz. silver, 4,669 tons lead and 45 tons hard or antimonial lead.

(*From Our Special Correspondent.*)

A new discovery of molybdenite is reported at Newton-Boyd.

The fall in lead has caused a decline in the shares of the Broken Hill Mines, but preparations are continued to start those mines that have not yet started. Another creep has occurred at the Central Mine, affecting the stopes down to the 600-ft. level. It is a continuation of the old creep of 1894. None of the working stopes were hurt.

Encouraging reports continue to be received form the Golden Victory gold mine, near Canowindra, which is working an 8-ft. reef. The ground has been pegged for a considerable distance.

The mild rush to the Williewa seems to have stopped. Only three or four diggers are on gold, while the others are barely making tucker.

QUEENSLAND.

Mt. Morgan Gold Mining Company.—This company reports for the month of March 19,515 tons of ore treated by chlorination, the yield being 11,259 oz. gold, which shows an average of 0.575 oz. gold per ton.

(*From Our Special Correspondent.*)

There has been some tall talk lately over the opening of the Cloncurry copper field. H. H. Caldwell, who says he represents the Rhodesia Company of South Africa, has taken up about 3,000 acres of copper land, and has the option on properties covering over 5,000 acres. Mr. Caldwell has stated that his company is prepared to spend £4,000,000 in developing the field if the Government would build a railway from Winton to Cloncurry, or allow his company to.

VICTORIA.

(*From Our Special Correspondent.*)

The North Woah Hawp Mine, Ballarat East, which is on the Indicator line, has opened up a regular "jewelers' shop," said to exceed anything before found in a winze from the 980-ft. level.

At the Waanyarra rush, Tarnagulla, the owners of claims in the bed of the creek have had to abandon them since the flood, and are now working in Montaigne's, Baker's and Cogswell's paddocks. The Hardhills rush, with the exception of the prospectors claim, is turning out very poor. A rush has broken out at Wildduck Creek, a little southeast of Eddington. This place has been worked four times previously, but each time the run of gold was lost after a little work had been done on it. The Long Tunnel Extended Gold Mining Company, at Walhalla, has declared its 226th dividend of 6s. per share.

The Birthday Berringa crushed 4,115 tons for 4,595 oz. during the past half year, and paid £6,600 ($32,010) in dividends, another 1s. 6d. dividend has been declared. Large bodies of ore are being opened. Development work, mining, milling and cyaniding cost 18s. 6d. ($4.44).

CANADA.

ALBERTA.

Intercolonial Coal and Coke Company.—This company has been incorporated under Washington laws, with $3,000,000 capital, par $1, to acquire coal properties at Blairmore, district of Alberta, 45 miles east of Fernie, on the Crow's Nest Division of the Canadian Pacific Railway. The coal area is about 7 miles in length, and there are nine veins on the property, four of which have been prospected. The aggregate width of these four seams is something over 60 ft. A. C. Flumerfelt is president, and H. N. Galer assistant general manager of the Granby Company, treasurer. The stock has all been subscribed for by Granby stockholders, so that while it is independent of the Granby Company, it will be closely allied with it. The construction of 100 coking ovens will be commenced at once, and the output of the mines will be sold to independent smelters and railways, in addition to the Granby Company.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Golden Eagle.—W. H. Tibbals has secured an option on this group of claims, located near Greenwood, for $135,000. The property was obtained for English clients.

Granby Consolidated Mining, Smelting and Power Company.—The condensed balance sheet of this company, dated January 31, has just been published. The statement shows a surplus of over $563,000, and is as follows: Assets, 338 acres mineral claims, $12,674,506; plant and equipment, $914,488; real estate and lands, $123,447; accounts and bills receivable, $24,126; ores on hand, at cost, $731,723; inventory supplies, $114,347; miscellaneous, $4,909; total, $14,587,549. Liabilities, capital stock, $13,363,030; accounts and bills payable, $660,584; surplus, $563,934; Total, $14,587,459.

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT.

Crow's Nest Pass Coal Company.—It is estimated that the number of men employed at Michel will reach a thousand, being larger than at any time in its history. The rock for the new coke ovens is being brought from the quarry at the rate of seven cars per day. The company has a large force at work at Morrissey building a trestle to connect with coal bins shortly to be erected. Harry Oldland, of Jefferson, Pa., has the contract for the 250 coke ovens at Morrissey, and has a force at work.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Center Star Mining Company.—This company has commenced an action against the Rossland-Kootenay Company in respect to the Nickel Plate Mine. The complaint alleges that the workings of the Nickel Plate extend to the Center Star ground, and that large quantities of valuable ore were extracted by the defendant from the Center Star Mine, also that the Nickel Plate Company permitted its workings to fill with water and to drain into the Center Star Mine, thus creating a grave menace to the lives of the workmen. A mandamus is asked compelling the unwatering of the Nickel Plate workings, and an accounting of the ore alleged to have been extracted. The first part of the action will doubtless hang on the interpretation of extralateral rights under the former law, respecting mineral claims. The matter of unwatering the Nickel Plate is an interesting legal point.

Kootenay.—This mine has commenced shipping 60 tons daily.

Le Roi.—The recent strike made on the 1,050-ft. level of this property, gives evidence of permanency.

War Eagle and Center Star.—About 300 men are employed on these properties. The War Eagle is shipping about 250 tons a day, and the Center Star is between 300 and 350 tons. A contract system of mining, developed by Superintendent Carl R. Davis, is used. The company intends putting up a concentrating plant, using a wet process, as soon as the details are worked out satisfactorily. Edmund B. Kirby is general manager of both properties.

White Bear Company.—This company holds its annual meeting at Toronto June 1. The company intends erecting a 100-ton concentrator on its property.

Le Roi No. 2.—The Elmore concentrating machinery for this mine reached Montreal recently on its way to the property. The crushing machinery was ordered in San Francisco.

BRITISH COLUMBIA—VANCOUVER ISLAND.

(*From Our Special Correspondent.*)

The miners employed in Dunsmuir's coal mines on Vancouver Island, have struck because of the discharge of union leaders, but the real issue is doubtless, as in other cases, the recognition of the Western Federation of Miners, Mr. Dunsmuir is a stubborn employer and has closed down other mines where strikes have occurred. A large force of Chinese miners has been put to work in the mines and the contest promises to be a bitter one.

The old stone quarries at Nanaimo are to be reopened to furnish building stone for San Francisco and other California cities.

Yreka Copper Company.—At the annual meeting at Tacoma, Wash., recently a new board of directors was chosen. The following officers and trustees were elected: C. M. Riddell, of Tacoma, president; C. B. Lynn, of Pennsylvania, vice-president; W. C. Spicer, of Tacoma, treasurer; S. T. Lewis, of Tacoma, secretary; Charles D. Atkins, of Tacoma, assistant secretary. Trustees: T. E. Hyde, Mr. Millard and Jas. B. Hammond, of Pennsylvania; N. S. Clark and A. F. Giving, of Victoria, B. C., and H. S. Owens, of Tacoma. The company's property is on Quatsino Sound, on the northwestern coast of Vancouver Island. A 10-drill air compressor is being installed, and about 100 men are employed. S. T. Lewis is manager, vice N. S. Clark, who takes charge of the company's smelter at Crofton. A main tram has been constructed to the waterfront, having a daily capacity of 600 tons, and bunkers have been constructed.

NEW BRUNSWICK.

Electro-Manganese Company.—This company, intends establishing a plant at Grand Falls for the reduction of bog ores. The people interested include Barton E. Kingman, of New York; Fred C. Sayles and Robert W. Sayles, of Providence, R. I., and others.

NOVA SCOTIA—CAPE BRETON.

Cape Breton Coal, Iron and Railway Company.—This company is preparing to develop its coal areas at Cochrane's Lake and Black Brook, Mira. The company controls 57 square miles of territory, containing seams of coal of various thicknesses, 12 square miles have passed Government inspection as being 5.5 ft. thick. The coal is pronounced of excellent quality. The company is capitalized at $4,000,000, the shares being $100 each. There is considerable American capital back of the company, but it is understood that the Royal Bank of Canada will take the bulk of the stock.

Dominion Chemical Company.—John Craven has arrived in Sydney from England to superintend the construction of a chemical plant for this company, which will use as raw material the tar produced at the by-product coke ovens of the Dominion Iron and Steel Company. The enterprise is undertaken by the British Chemical Company, Burt, Boulton and Haywood, which has chemical works at Selvertown, Eng., Ealing, near Southampton, Eng.; Selzaite, Belgium; La Trense, near Bordeaux, France, and Bilboa, Spain.

Richfield Mining Company, Limited.—This company, incorporated to acquire from the Inverness Mining Company, Limited, property at Cheticamp, and developing deposits of gold, silver and copper-bearing arseno-pyrites, was organized in Sydney recently. The officers and directors are: President, Edward Stairs, vice-president, H. St. C. Silver; managing director, William R. Dunn; secretary-treasurer, John W. Regan; C. F. McIsaac, Antigonish, T. H. Estabrooks, St. John, N. B.; James Reeves, James Reardon, Halifax; F. A. Ronnan, Halifax. The company is acquiring, among other property, the Iron Cap and Mountain Top, in which are deposits carrying gold, silver, copper and arsenic.

ONTARIO.

Canadian Northern Company.—D. D. Mann, vice-president of this company, corroborates the report that this company has sold its entire land grant, exceeding 3,000,000 acres, for $12,000,000. Among the parties interested are: Col. A. B. Davidson, A. D. McRae and George C. Howe, Duluth; A. R. Davidson, Little Falls, Minn.; D. P. McDonald, Fort Qu'Appelle, N.W.T.; A. J. Adamson, Rosthern, N.W.T.; F. C. Kenaston, George F. Piper, W. D. Douglas, Minneapolis, Minn.

EUROPE.

SPAIN.

(*From Our Special Correspondent.*)

New Mining Law.—According to a royal decree dated April 17, the proposed changes and modifications in the law conceding mining concessions, have been provisionally approved. The new law is of considerable interest, and of great importance for the people acquiring mining properties in Spain. In many ways the new conditions are favorable to the holders of mining concessions.

NEW CALEDONIA.

The *Bulletin du Commerce*, of Noumea, reports exports of minerals for the two months ending February 28 as follows: Nickel ore, 7,895 metric tons; cobalt ore, 936 tons; chrome ore, 2,064 tons, of which 2,024 tons were to New York.

A German syndicate has taken an option on the valuable nickel property at Ouenghi.

A tramway is under construction from the Revelation nickel mine at Voh to the bay of Vouavouto. It is 2.4 km. in length.

It is reported that the Nepoui nickel mine, owned by the International Nickel Company, is to be closed down. The miners have all been laid off for the present.

NEW ZEALAND.

Exports of gold and silver for February and the two months ending February 28 are reported by the Mines Department as follows, in ounces, the gold being crude or bullion:

	Gold.		Silver.	
	1902	1903.	1902.	1903.
February	41,632	16,238	48,842	56,818
Two months	74,492	65,008	85,217	119,161

The decrease in gold was 9,484 oz., or 12.8 per cent; the increase in silver, 33,944 oz., or 39.8 per cent. The gold bullion reported this year was equal to 50,328 oz. fine gold, or $1,205,630.

SOUTH AMERICA.

CHILE.

Alianza Nitrate Company, Limited.—The net profit in 1902, after providing for London charges, was £172,657. Adding £8,581, the balance brought forward from 1901, and deducting £30,000 (3 per cent) interim dividend paid November 15, 1902, leaves a balance of £151,238. From this sum a final dividend of 7 per cent (£70,000) making 10 per cent for the year; £31,756 for exhaustion of mines, being at the rate of 4d. per qtl. on the quantity of nitrate, for which profit is taken in the year's accounts; £7,939 for further provision for depreciation of plant and machinery; £40,000 for reserve fund, and £1,543 to be carried forward to 1903. The debenture debt has been discharged, £90,000 outstanding on December 31, 1901, having been paid off on July 1, 1902. Sales of nitrate of soda in 1902 were 1,905,358 qtls. (86,607 long tons), as against 1,720,882 qtls. (78,222 tons) in 1901.

Angela Nitrate Company, Limited.—The gross profit in 1902 was £32,237, from which £12,108 should be deducted for expenses; leaving a balance of £20,129 to be carried forward. Adding £6,416, the balance from 1901, and deducting the debentures redeemed on January 1, 1902, the interim dividend of 1s. per share paid in May last, there remains £16,745. Of this there will be appropriated £6,300 for amortization of debentures; a further 5 per cent dividend, making 10 per cent for the year; £5,000 for reserve fund, and £1,945 to be carried forward. The new oficina, which is thoroughly equipped and of the most modern type, has been running satisfactorily since April, 1902.

Nitrate Railways Company, Limited.—Gross receipts in 1902 were £505,798, and net, £261,197. Adding the balance of £184,405 brought forward from 1901, the amount received for war claim, and transfer and other fees, and deducting the dividend paid on May 6, 1902, and the money expended on construction in 1901, there is a net revenue of £399,121. Deducting various items, a balance of £243,461 is left. The directors recommend the payment of a dividend of 5 per cent on the ordinary shares and preferred converted shares, which will absorb £82,800, and that the balance of £170,661 be carried forward to the next account. The total traffic was 22,456,515 qtls., against 19,410,114 in 1901. The total working expenses in Chile was £236,907, against £223,163, in 1901. The exports of nitrate of soda during 1902 amounted to 30,089,440 qtls., of which 16,642,810 qtls. were carried by the company.

MINING STOCKS.

(Full quotations are given on pages 807 and 808.)

New York May 20.

Warm weather, coupled with the reluctance of the public to invest, even at present low prices, has put the mining stock market almost to sleep. Occasionally there is a little earnest trading, as was influenced by Amalgamated when its rival, the Calumet & Hecla Company, declared an increased dividend. Since Monday Amalgamated sold up 2⅛ to $65, then down to 61½, and Anaconda 1½ to 101½ per cent ($25⅜), then $24¾. Curb coppers are weak, as outside buyers are few and insiders do not care to operate to any great extent. Greene Consolidated, of Mexico, changed hands at $21⅛@$22; Tennessee, $28@$29: United, of Montana, was $15 bid and $18½ asked, without calling a sale; White Knob, of Idaho, sold at $15½@$16¾, and British Columbia, $4½@$5. Two hundred shares of Bamberger-De La Mar Gold Syndicate, of Nevada, brought $10@$10½.

Practically the same depressing influences are manifest in the gold and silver stocks. Of the Cripple Creeks, Portland went off at $1.28; Elkton, at 35@38c., and Isabella, at 18½c., while C. K. & N., which has declared a 1c. dividend, brought 21c. The Comstock shares showed trading in Consolidated California & Virginia at $1.15; Caledonia, $1.70; Ophir, $1.50, and Mexican, 78c. Silver Hill, the only dividend payer in Storey County, Nevada, has risen to $1.30, but later receded to $1.15.

A surprise was caused by the reduction in the Standard Oil quarterly dividend to 7 per cent, which compares with 20 per cent paid in March of this and last year. In the first two quarters this year the company declared 27 per cent, amounting to $26,190,000, which is 3 per cent, or $2,910,000, less than was paid in 1902, and 5 per cent, or $4,950,000, less than 1901. The value of the stock has been hammered down to $644, or 40 points loss in a week.

Saturday, May 16, was the last day to exchange preferred stock for 5 per cent bonds of the United States Steel Corporation. It is intimated, however, that the underwriting syndicate would continue to October 1. About $120,000,000 preferred stock has been turned in out of the $200,000,000 solicited. The bonds were quoted on Monday up to 87⅞, but later declined to 85, while the preferred stock brought 82½@83½. The common shares on the same day sold at $33@$33⅝.

Auction sales were 180 shares Homestake, of South Dakota at $50 per share; $3,200 6 per cent special contract bonds of the Tombstone Consolidated Mines Company of Arizona, and 320 shares of stock at $3,500 per lot.

Boston. May 19.

(From Our Special Correspondent.)

Copper shares continue in the same rut, although a firmer undertone is noticeable since the declaration of the Calumet & Hecla $10 dividend. Ordinarily this increase from the $5 rate of the past four quarters would have been reflected in a sharp advance in stocks, but it was without effect at this time. This, together with the fact of the large decrease in the visible supply of the metal abroad, pass with nothing more than a notice, but it is felt that this situation of affairs will change shortly. It is demonstrated by the Calumet's increase that mining companies are making money, and while this is a fact the shares are selling considerably lower than a few months ago. Brokers report they are carrying few securities on speculative account.

Calumet & Hecla stiffened $5 to $530, although it sold at $520 during the week. Tamarack, on the other hand, dropped $20 between sales to $120, with a recovery. In February last the stock sold at $190, and in 1901 it sold at $363, which represents a pretty heavy depreciation on the 60,000 shares of stock. Trimountain directors are expected to meet most any time, and declare quarterly dividend No. 2 of $1.50 per share. The stock hangs around $91@$89.50. Copper Range worked off $3.62½ to $60.25, but rallied to $62.25. The Champion's rock pile of about 50,000 tons is now being treated. Utah Consolidated sagged $1 to $28.50, but recovered to $29.25. A dividend is expected to be declared next month of $1.50. The company is said to be earning at the rate of $1,200,000 per year, or $4 per share.

The feature this week was the sharp break in Dominion Iron and Steel, which fell $6.50 to $21.75, with recovery to $23.50 to-night. Dominion Coal was also weak in sympathy, falling $5.50 to $100.50, recovering to $102. Canadian interests have been heavy sellers of these stocks of late. Winona fell $1.62½ to $10.50 on labor troubles, but recovered to $11. Centennial fell $2.50 to $23, but easily recovered to $24.50, and Bingham has lost $2 to $28.75. Parrot fell $2.37½ to $26.12½ on light offering; also Atlantic $1.25 to $10.50. Quincy is $4 lower at $109, and United States settled $1.75 to $22.75. Arcadian touched its lowest price at $3, and Elm River sagged to $3.50. Mass Mining is off $1.25 to $8, and American Zinc declined $2.12½ to $10.50. Diamond drill operations at the Elm River will be pushed with vigor this summer. Wolverine is off $1 to $70, even though a new vein has been struck west of No. 3 shaft. United States Coal and Oil fell $1 to $13.25 on the reduction in the price of crude oil.

The Boston Consolidated will issue $500,000 7 per cent bonds at par to erect a smelter with 500 tons capacity.

Colorado Springs. May 15.

(From Our Special Correspondent.)

The market at the opening of business this week was fairly strong, but a reaction has taken place during the past three days, the result being a decline in prices all along the line with but few exceptions. Selling orders seem to be responsible for the break in the quotations. In several cases where stocks have enjoyed a marked advance, prices became top heavy, and a sudden reaction followed. The volume of trading has been heavier than usual, and it is believed generally that the present depression in prices will be of short duration.

C. K. & N. a week ago closed at 19c. bid, but to-day sold at 19⅜s. on good receipts as to the production made by lessees on that property. Elkton made no change from last week's quotation, selling at 38c. El Paso sold from 59@59½c. during the week, closing at the latter figure to-day. Gold Dollar sold from 5½@5¾c., but sagged to the former figure to-day. Golden Cycle sold at 78c. last week, and was offered to-day at 75½c., with no takers, 74c. being the highest bid. Portland, in sympathy with the majority of the mines list, sold down from $1.38 seven days ago to $1.34 to-day, the bid at the close being $1.30 against $1.37 last week. Vindicator and Isabella were stationary at 90c. and 16c., bid, respectively.

The prospect list enjoyed a popular week, but, as a whole, at the close of the week's business, is on the decline.

Salt Lake City. May 16.

(From Our Special Correspondent.)

During the week ending May 16 the sales of stocks on the Salt Lake Mining Exchange amounted to 346,745 shares, which brought the sum of $251,972.80, an increase of a little over $75,000, compared to the previous week. The stocks of Tintic District mines were the most active. Lower Mammoth leading the list, registering transfers to the amount of 89,300 shares, showing an advance from $1.15 per share on Monday to $1.51, this date. Next in line came Star Consolidated, which opened strong, closing at 32¾c. The first sale of the week was made at 24c.; 66,100 shares were sold. Yankee Consolidated was also in demand, and sold up to 49c. This stock weakened towards the last, but closed about 18c. above the opening on Monday; 13,800 shares transferred. Uncle Sam was another Tintic favorite, 8,800 shares exchanged at prices ranging up to 38c.

Park City stocks were in little demand this week, excepting New York, for which there was call for 17,300 shares. The market advanced about 4c. a share. Daly West, Daly-Judge and Daly were brought out in limited quantities, but at downward prices. Creole and Naildriver are looked upon as good prospective stocks, while Comstock is gaining favor since the starting of the new mill at that property. The Bingham stocks transferring were United States and Ben Butler. A 100-share lot of the former was offered and taken at $23.62½. Ben Butler was in heavy demand at advancing prices, a result of the effecting of a plan of consolidation with the Chicago-Bingham Company and the dismissal of pending litigation between the two corporations. Local market conditions are good at the close of the week.

San Francisco. May 16.

(From Our Special Correspondent.)

Business has been fair, in spite of the interruptions caused by the President's visit. Prices were fairly well sustained.

Best & Belcher sold at $1.70; Caledonia, $1.45; Consolidated California & Virginia, $1.35@$1.40; Sierra Nevada, 65c.

The sworn statements of the mining companies, as filed in their offices this week, show cash on hand on May 1 as given, with all expenses paid, unless otherwise noted: Andes, $3,573, with $1,064 due on electric contract; Belcher, $14,953, with $1,000 payable and April expenses unpaid; Best & Belcher, $9,261, with bills payable of $7,500; Bullion, $1,837; Caledonia, $8,617, with April expenses unpaid; Consolidated Imperial, $2,221, April expenses unpaid; Challenge Consolidated, $581, April expenses unpaid; Crown Point, $7,595; Consolidated Imperial, $2,221, April expenses unpaid; Challenge Consolidated, $581, April expenses unpaid; Crown Point, $7,595; Consolidated California & Virginia, $195, with $14,000 due bank; Consolidated New York, $1,703; Confidence, $280, April expenses unpaid; Gould & Curry, $9,822, with bills receivable of $7,500; Julia Consolidated, $1,283; Justice, $1,586; Mexican, $1,083, with $1,000 due bank; Ophir, $11,298; Overman, $5,593, with April expenses unpaid; Savage, $3,193; Segregated Belcher, $2,786; Sierra Nevada, $298, with bills payable of $2,000; Standard Consolidated, $105,610, with April clean-up and April expenses to be accounted for; Silver Hill, $22,998; Syndicate, $2,187; Union Consolidated, $2,006; Utah Consolidated, $29.

The following companies report no cash on hand, but indebtedness on May 1 as follows: Alta, $1,378; Chollar, $2,521; Lady Washington, $927; Potosi, $2,715.

The following companies in the above list have assessments in course of collection: Chollar, Consolidated California & Virginia, Confidence, Justice, Mexican, Potosi, Segregated Belcher and Sierra Nevada.

Business in oil stocks was good, both in the higher-priced shares and the prospects. Hanford sold at $117@$120; Twenty-eight, $4.25; Monarch, 56c.; Lion, 6c.

The monthly record of sales on the California Stock and Oil Exchange to date is as follows:

	Shares.	Amount.
January	267,019	$255,202
February	322,443	219,358
March	199,908	151,982
April	236,268	115,571
Totals	1,025,638	$742,113

April showed a considerable improvement over March, but was still behind January and February.

COAL TRADE REVIEW.

New York, May 21.

ANTHRACITE.

The anthracite coal trade shows no falling off in the great activity that has prevailed since April 1. Demand is strong from all parts of the country, even from Upper Lake ports, where buyers last year and the year before showed less eagerness to take coal at May prices than those in the East. At the mines the men have practically all returned to work that they may have a standing before the conciliation committee, which is to consider their grievances. The miners, while not working as actively as they might, are still busy enough to get out a very heavy tonnage.

Whether because his attorney was not confident of the merits of his case, or because, with the thermometer in the nineties, people are not interested in the price of coal, the attorney for the New York Congressman-elect, who is going to destroy the "coal trust," and presumably give everybody coal for less than the cost of production, has not presented his case to the United States Circuit Court, but has had the hearing twice postponed. The Interstate Commerce Commission was to resume taking evidence next week, but evidently the plaintiff's attorney cannot hope to acomplish anything until the courts have passed on the question of just how far the Commission can consider coal prices as factors in transportation rates.

Trade in Lake Superior territory is active, coal being shipped to inland points almost as fast as it arrives on the docks. In Chicago territory also, demand is very strong, probably stronger than ever before for this season of the year. Along the lower Lakes and in Canadian territory, buying continues active. At seaboard points, all dealers are trying to get all the coal they can at May prices. Some large lots of very poor washery coal, pea size, that had been standing at New York Harbor, sold lately at prices which net 8c. per ton after demurrage charges, etc., are paid.

Retail business has been light all over the country on account of the weather.

BITUMINOUS.

The Atlantic seaboard soft coal trade continues generally dull and inactive, with little sign of any great immediate improvement. The topic most discussed, at least among sales agents at New York, is the possibility of increased shipments all-rail from the mines to New England points. It is argued that owing to the high ocean freight rates and the prices named on coal at the beginning of the season it is considerably cheaper to ship all-rail than in the regular way, that is, by rail to a loading port, thence by water to a dischrging port, and thence by rail again to some inland consumer. Considerable coal is going to New England all-rail just now, but the movement actually started last year.

Trade at points in the far East is light, though orders are more plentiful from there than from any other consuming territory. Along Long Island Sound trade is very dull indeed, even duller than it was last week. At New York Harbor points demand is slack, as even those concerns having limited storage capacity are shy in giving new orders. In the all-rail trade consumers are taking about half of the amount they contracted for. It is thought that during the heavy shipments in March at last year's contract figures a lot of coal was put in storage. Car suply at the mines is now about 50 per cent of the demand. Transportation from the mines to tidewater is prompt, coal running through in less than a week. In the coastwise vessel market, vessels of ordinary size are scarce, and freight rates are firm. We quote for vessels of ordinary size from Philadelphia as follows: Boston, Salem, Portland and Portsmouth, $1.15; Providence,

New Bedford and Long Island Sound, 90c.; Lynn, Gardner and Newburyport, $1.35; Bath, $1.20; Bangor, $1.40. From New York Harbor rates are about 75c. to Long Island Sound ports and $1.25 to points beyond Cape Cod.

Birmingham. May 18.

(From Our Special Correspondent.)

The production of coal is still of considerable size. Coal prices remain up. The efforts of the operators now are to get out as much coal as possible before the middle of next month when the convention of the miners begins. In some circles there is a belief that the miners' principal demand will be for eight hours to constitute a day, while others believe that an advance in the wage scale will be demanded. There is some intimation that a new wage scale will be demanded. There is one intimation that a new wage scale will not be formulated with as much ease as might be desired, and it is possible that the contentions will be prolonged.

In the western part of Jefferson County the Globe Coal Company has its new large shaft in readiness for steady operation, and the same company is preparing to open some new mines along the new branch line being constructed by the Louisville & Nashville.

Chicago. May 18.

(From Our Special Correspondent.)

There is little change in the wholesale coal market. Sales of anthracite continue to be heavy, and the receipts by lake are estimated to be one-third larger than usual at this season; the price of anthracite continues for car lots, $6.10. There is every probability that the demand for anthracite will continue heavy well into the summer. The market for bituminous coals is, on the whole, light, but the better grades, notably the smokeless, show a permanently improved demand over this season in previous years. Contracts are, as previously, distinguished for their scarcity. Everybody who has coal to sell wants to get the benefit of any changes that may come to the market, without incurring any of the penalties of the more closely drawn contracts. Country business seems, in a general way, better than city business. During the scarcity of coal last winter it was noticeable that few country customers were lost even temporarily to Chicago dealers, while the renewal of business this spring due to greater supply of both bituminous and anthracite, has brought with it the customary percentage of increase that Chicago dealers are accustomed to look for as a natural part of their business. The increase in dealers has caused competition to be somewhat sharper for city trade, but has not affected sales by the larger Chicago dealers so much as those made directly by operators on yearly contracts heretofore.

Smokeless continues at $3.75@$4; Hocking and Youghiogheny, at $3.50@$3.60; Indiana and Illinois lump, at $2.15@$2.40; Indiana and Illinois, run-of-mine, $1.75@$2, Smithing coal is in demand at $4.50. All grades are plentiful, except smithing.

Cleveland. May 19.

(From Our Special Correspondent.)

The coal trade in this territory is beginning to reflect a little more accurately the railroad situation. At the lake ports the railroads are slowly but surely congesting seriously, and while it has not affected as yet the supply of coal or coke for factories or coal for the lake trade the situation is ominous. The coke supply of recent weeks has been so large that the prices are easing, and the process is still working. Furnaces in the Valleys are collecting stocks of coke against the possible congested condition of the railroads. The domestic supply of coal and the amount available for the factories is all that could have been desired.

The lake coal situation is gradually improving and the uormal conditions as to shipment are being more nearly approached. How long this will last will depend upon the car situation. Lake boats are in fair demand, but the cargoes are not plentiful enough to keep all of them employed. A little has been said about further contracting for the season, but nothing has been done. Shippers have been trying to lower the rates. This talk of further contracts is said to be the result of an increase in the amount of material sold in the upper lake region. Prices have remained unchanged at $2.45 for Pittsburg and West Virginia lump, and $2.35 for Ohio lump.

Pittsburg. May 19.

(From Our Special Correspondent.)

Coal.—There is but little change in the situation. All the mines are in full operation, and there is no complaint of a scarcity of railroad cars. Shipments to the lakes for the Northwestern trade continue heavy. A determined effort is to be made by the officers of the United Mine Workers to organize the miners in the Irwin field which adjoins the Pittsburg District. President John Mitchell and Vice-President T. L. Lewis, of the national organization, have agreed to assist in the work, and the first of a series of meetings will be held on Saturday. The miners employed by the Sharon Coal and Limestone Company, a subsidiary concern of the United States Steel Corporation, in Mercer County, went out on a strike yesterday, and the Sharon steel works, which gets its supply of coal from these mines, may be crippled. The miners are unorganized, and were paid 58c. a ton on a run-of-mine basis, while the union rate is 56c. The company reduced the rate to 56c., and the men quit.

Connellsville Coke.—Production and shipment remains about the same as last week, and prices are unchanged. Furnace coke is quoted at $3.50@$4 and foundry at $4.50@$5. The production, according to the last report in the *Courier*, was about 250,000 tons for the previous week. The shipments for the week were 11,598 cars, distributed as follows: To Pittsburg and river tipples, 4,126 cars; to points west of Pittsburg, 5,736 cars; to points east of Connellsville, 1,810 cars. This was a decrease of 8 cars compared with the shipments of the previous week.

San Francisco. May 16.

(From Our Special Correspondent.)

Trade has been quiet, with about the usual arrivals. Stocks are good, except in Eastern coals.

Yard prices to dealers for Pacific Coast coals in large lots are as follows: Wellington and New Wellington, $8; Rosslyn, $7; Seattle and Bryant, $6.50; Coos Bay, $5.50; white ash, $5. Rocky Mountain coals in car-load lots are quoted at $14 for Colorado anthracite, and $8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal in cargo lots is at present nominal, but quotations are $14 for Pennsylvania anthracite and $13 for Cumberland. Foreign coal in cargo lots sells as follows: Welsh anthracite, $13; cannel, $8.50; Brymbo, $7.50; Wallsend, $7.50.

Foreign Coal Trade. May 21.

There is nothing new to report here, either in import or export trade.

Exports of coal and coke from Great Britain for the four months ending April 30 were, in long tons:

	1902.	1903.	Changes.
Coal	12,750,864	13,788,050	I. 1,037,186
Coke	188,916	202,497	I. 13,581
Briquettes	340,299	255,868	D. 84,431
Totals	13,280,079	14,246,415	I. 966,336

Coal exports to the United States this year were 1,021,143 tons, against 21,532 tons in 1901. In addition to the total exports given above, there were 5,039,348 tons of coal sent abroad for the use of steamers engaged in foreign trade, against 4,641,848 tons last year.

Imports of coal into Germany for the three months ending March 31 were, in metric tons:

	1902.	1903	Changes.
Coal	1,053,746	1,279,805	I. 226,059
Brown coal (lignite)	1,660,789	1,935,775	I. 274,986
Coke	98,070	102,483	I. 4,413
Totals	2,812,605	3,318,063	I. 505,458

The chief imports of coal were from Great Britain; those of brown coal were all from Bohemia.

Exports of coal from Germany for the three months ending March 31 were, in metric tons:

	1902.	1903.	Changes.
Coal	3,508,632	4,385,386	I. 876,754
Brown coal	4,260	5,822	I. 1,562
Coke	439,704	610,815	I. 171,111
Totals	3,952,596	5,002,023	I. 1,049,427

The chief exports of coal were to Austria, Belgium and Holland; of coke to France and Belgium.

Messrs. Hull, Blyth & Co., of Cardiff and London, report under date of May 8 that the general tone of the Welsh coal market is unchanged. Prices remain firm for all descriptions of coal. Quotations are: Best Welsh steam coal, $3.66@$3.72; seconds, $3.60; thirds, $3.48; dry coals, $3.36; best Monmouthshire, $3.30@$3.42; seconds, $3.12; best small steam coal, $2.22; seconds, $2.04; other sorts, $1.92.

The above prices for Cardiff coals are all f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The freight market continues easy, with tonnage in excess of orders. Some rates quoted from Cardiff are: Marseilles, $1.50; Genoa, $1.32; Naples, $1.32; Singapore, $2.46; Las Palmas, $1.50; St. Vincent, $1.62; Rio Janeiro, $2.16; Santos, $2.52; Buenos Aires, $1.74.

IRON TRADE REVIEW.

New York, May 21.

The iron market continues to be a waiting one, to a considerable extent. Buyers are still holding back on orders for fourth quarter delivery, with the evident belief that concessions can be secured. On the other hand, producers claim that in spite of the present very large output of pig iron, there is no prospect of lower prices. The case of the sellers is very strongly stated in our Pittsburg letter in another column. The truth seems to lie between the two extremes, and the present condition of suspense is likely to continue for a time, as there is no present necessity for purchasing supplies, most large consumers having all their material contracted for up to September.

The strikes in the building trades in New York and elsewhere continue to exercise an unfavorable effect on the market for finished materials. Structural steel especially has shown few new orders, while mills are not receiving specifications on contracts as promptly as they might desire.

Railroad deliveries of coke and ore in the Central West are generally prompt. There are signs, however, of trouble ahead when summer trade fairly sets in.

Exports of pig iron from Great Britain to the United States for the four months ending April 30 were 184,471 tons, against 32,407 tons in the corresponding period in 1902; an increase of 152,064 tons. In exports of steel to the United States the report includes 5,890 tons of steel billets against none in 1902; 18,735 tons of plates, against 26,565 tons last year; and 5,391 tons angles and shapes.

Exports of pig iron from Germany for the three months ending March 31 were 115,579 metric tons, against 73,243 tons for the corresponding period in 1901. This shows an increase of 42,336 tons, due chiefly to large shipments to the United States. Exports of steel billets are not reported separately. The total exports of iron and steel, outside of pig iron, were 785,877 tons this year, against 657,140 tons in 1901; an increase of 128,737 tons.

Birmingham. May 18.

(From Our Special Correspondent.)

Rumors prevailed all during the past week that iron was being sold at a reduction of from 50c. to $1 per ton, but inquiry at the general offices of the larger iron concerns elicited no information warranting the statement. There has been but little change in the production. The furnace at Bessemer belonging to the Tennessee Coal, Iron and Railroad Company, and one at Anniston, belonging to the Woodstock Iron Company, which went out of blast during this month, will reduce the general production but little. The Sloss-Sheffield Steel and Iron Company will blow out one of the Sheffield furnaces shortly, as it needs repairs. No other furnace in this district contemplates shutting down in the near future. Furnaces in operation are doing well, and the supply of raw material is heavy. Shipments of iron from this section are still heavy, though not as great as the production.

Some intimation that prices were reduced in contradiction to orders of the Association of Furnaces, but this is not corroborated. Consumers are making a strong fight for a general reduction in prices. During the past week an announcement was made that some buying had been done for large quantities of the lower grades of iron for piping and tubing. It was stated that the regular quotations had been adhered to.

The following quotations are given West: No. 1 foundry, $18; No. 2 foundry, $17.50; No. 3 foundry, $16@$16.50; No. 4 foundry, $16; gray forge, $15.50 @$16; No. 1 soft, $17@$19; No. 2 soft, $17.50.

The foundries and machine shops in the Birmingham District announce that there is no change in conditions with them. At the rolling mills there is steady employment for a large complement of men. In the Birmingham mills the shet department is the only portion working slack. There is a fair demand for finished iron.

At the steel plant steady operations are noted. An official statement is given out that the plant of the Alabama Steel and Wire Company at Ensley will shut down for repairs just as soon as the stock of steel rods has been used up in the wire and nail mill departments.

The annual meeting of the stockholders of the Woodward Iron Company, owning and operating two furnaces 10 miles south of Birmingham, was held last week, and the old directors and officers were re-elected. The board of directors authorized the erection of a third furnace, and work thereon has been started. This furnace will have a capacity of 300 tons a day. J. H. Woodward is president of the company, with R. H. Bannister secretary.

Chicago. May 18.

(From Our Special Correspondent.)

The dullness of the pig iron market has resulted in an acknowledged cut of 50c. below the prices quoted last week, and a possible cut of still more. To-day No. 2, Southern or Northern, is quoted at $20.85, against $20.85 a week ago. Predictions are freely made by those interested in the market that the price of Southern will go $1 below the present price before there coms a reaction against the depression. Everybody this week as last week is buying from hand to mouth; there are few sales at best, and the few that do occur are for delivery as soon as the furnace can load the material on the cars. There are all sorts of premiums for speedy delivery, and the only sellers who are satisfied are those who have spot iron to unload. These, it is hardly necessary to say, are few, and the amount of iron they are unable to unload is very small indeed.

That the present is a good opportunity for the buyer able and willing to take advantage of the slackness is believed by all in close touch with the market. The

price of coke is probably now at a minimum for the year—$7@$7.25—the railroads are in all probability about to repeat the experience of former years in securing an autumn traffic that will be beyond their capabilities of handling, and there are no physical difficulties of movement for either coke or iron, attributable to the weather, for several months yet. For deliveries six months ahead the prospect is favorable to present purchases; much more favorable than it will be to speedy delivery purchases a few months hence. Orders in general may be said to be small, and there is a noticeable tendency to avoid contracts for any constant supply; thus the market is growing more affectable by speculative influences, and the chances for the buyer or seller of speculative tendencies are greater than normally exist. There is no complaint of conditions from proprietors of local furnaces, however, these furnaces are being crowded to their capacity and the end is not within the vision of the business world. Most of the hustling is being done by agents of Southern furnaces, who are anxious to dispose of their products in the same manner as heretofore, and oppose the idea of a change in the method of selling, as to time.

Cleveland. May 19.

(From Our Special Correspondent.)

Iron Ore.—The shipment of iron ore down the lakes began to be very lively yesterday, and shippers are now getting all of the ore at the loading ports that they can handle over the Lake Erie docks without increasing the congestion at the lower ports. The rates of carriage remain unchanged at 85c. from Duluth as a basis. Nothing is being heard of sales of ore, but the prices might be quoted without change at $4.50 for bessemer old range and $4 for bessemer Mesabi.

Pig Iron.—The demand for foundry iron at present is equal to and, in fact, slightly in excess of the supply for quick shipment. The demand for second half has eased off, if not altogether stopped, as there is a great deal of contention about the prices that are to be paid. The cuts that have been reported in the Eastern territory have not affected this market, as the prices have held firm and some sales have been made in small lots of 300 or 400 tons in adjacent territory. The prices have not varied in the least, being $22, Southern Ohio Furnace, for first half, and $21 @$21.50 for second half Valley furnace, for No. 2. Bessemer and basic are off of the market for the time being, as no material is available for first half delivery, and the consumers are not yet ready to cover for the second half. The contention as to prices continues in that respect, and although reports have been abroad of sales at a lower figure elsewhere, the prices here have held firm at $21.50@$22 for first half and $20, Valley furnace, for second half for basic; while bessemer is bringing $21.50@$22 for first half, Valley furnace, and $20.50@$21 for second half, Valley furnace. These quotations are purely nominal.

Finished Material.—The sheet trade has been the best feature of the market. The buying has been strong, and the general state of the trade is good. Prices have not changed being based on a quotation of 3.10@3.25c. for No. 27 black sheets out of stock. The same cannot be said of the plate trade. The conditions are a little easier, and the market is softening, but only to that extent where some of the mills are able to take care of more tonnage than they have been able to accept heretofore. The smaller mills have not been routed out of their premiums altogether, but the end is near. The quotations are 1.60c., Pittsburg, from the large mills, and 2c., Cleveland, from the smaller concerns. The structural trade is not at all brisk; as in plates, the demand has been curtailed, and specifications have been lagging. This one feature of these two grades of finished steel has been puzzling. Structural prices have held firm, but the market is notably weak, the smaller mills not being able to obtain any business. The prices have not changed from 1.60c. at mill, and 2.15@2.25c. out of stock. Bar iron has eased, and some slight cutting of prices has been made, one lot being quoted at 1.75c. at the mill, which was located at Cleveland. The Valley and Pittsburg mills are firm on the old basis of 1.80 to 1.85c., Youngstown. The buying of bar steel has been only fair, and yet it must be said that the present lull is not indicative of any extensive reaction. The big agricultural implement works are the only ones that are out, and they are deterred by the strike at the Deering works. Prices on steel have held at 1.60c., Pittsburg, for bessemer, and 1.70c., Pittsburg, for open-hearth.

Old Material.—The material available is voluminous, and the sales are very light. Prices are inclined downward without a break.

Philadelphia. May 20.

(From Our Special Correspondent.)

Pig Iron.—Interviews this week with several leading pig iron interests disclose a belief, or, at least, a very strong opinion, that the consumers of pig iron will be surprised by June developments. The makers of pig iron take the attitude that there is no sound reason for the lack of confidence in the pig iron market, and they furnish some pretty strong reasons for their opinions. They claim that if any weakness in pig iron is to come it should be in pig used for steel-making purposes rather than for foundry and forge iron, as the margin of profit in steel pig is much lerger than in the latter. They further claim that the decline in coke has been offset by advances in cost of porduction in other directions, and they claim that the talked of further decline in coke is not likely to occur. Putting all their reasons together it can be seen why they think that foundry and forge iron will not decline much farther. Buyers, on the other hand, view the matter from a different standpoint, and believe with apparent confidence that there are weakening tendencies at work which will enable them to buy early in June to better advantage than at present. Hence, it is that just now the demand for iron is unimportant. Quotations are given at $21@$21.50 for No. 1 foundry; $20 for No. 2X, and about the same for No. 2 plain. Standard brands of gray forge are quoted at $20, and ordinary gray forge at $18.50; small lots of Middlesboro have sold at $20, and of Scotch at $21.

Steel Billets.—Steel billets are attracting a great deal of attention, and large consumers here are awaiting further developments from abroad, and will probably place their orders, provided deliveries can be made at about $1 per ton less than is now understood to be the bottom price. German billets are quoted at $28; soft steel American billets at $31.50. The strong point in the market is the heavy consumption.

Merchant Bar.—The disagreement in the Eastern bar iron association has been intensified by the withdrawal of one or two influential members, and a general shading of prices has resulted, which makes it difficult to give actual selling prices. Quotations may be given at 1.85c. for best refined bars; common bars in large lots have sold at 0.2c. less, and it is rumored even below this figure.

Nails.—The country demand for nails, particularly cut, has been quite active this week, and stock is being hurried from factories to stores.

Skelp Iron.—Skelp iron is very active in Western markets ,and two or three Eastern mills have recently secured sufficient business to keep them going for a while.

Sheets.—Slight concessions have been extended to large consumers by way of inducement to place autumn orders. In a small way business is good, particularly from stores.

Merchant Steel.—The market has been very quiet for a week, but it apears that the consumption of nearly all kinds, particularly tool steel, is larger at this time than it has been for months. It has also been said that shafting has been shaded, but this point cannot be verified. Tire steel is strong, and ordinary grades of open-hearth steel are meeting with a steady demand.

Plates.—The heavy orders which are being placed for steel plates are having a favorable reflex influence on this market, but there is an expressed apprehension that if the quotations at which mills outside of this territory are taking orders there will be a shading here. Quarter-inch plate is quoted at 1.80c. in large lots. Universals, 1.75@1.85c.; flange, 2c.; marine, 2.10c.; firebox, 2.20c.

Structural Material.—Recent buyers have been encouraged at the greater promptness manifested by manufacturers in making deliveries and in taking orders for early delivery. Makers are catching up with demand, but this fact does not afford any assurance that they will shade prices. Quotations are 1.73½@1.78½c.

Steel Rails.—Steel rails are firm at $28 for standard sections; girder rails are in very good demand, and some trolley line builders who came into the market a few days ago expecting to obtain early deliveries, are unable to close satisfactory terms.

Old Rails.—Old rails are quoted at $22 for steel; $25 for iron.

Scrap.—It is very difficult to obtain steel scrap, and $21 would be readily paid for the right sort of stuff. Scrap iron merchants are ndeavoring to accumulate stuff in anticipatio nof a better demand in June. They are holding machinery scrap at $20; No. 2 light scrap at $19. Railroad scrap is all spoken for.

Pittsburg. May 19.

(From Our Special Correspondent.)

Despite the disquieting reports of the past week the iron and steel markets are as strong as ever, and there is no sign of weakness. Prices in all finished lines are being strictly maintained, and in some instances premiums are still paid for prompt delivery. The absurdity of the reports of cuts in pig iron and steel billets is aparent when the market shows a decided scarcity in billets, and the furnaces are not forced to make heavy reductions in price in order to get business at the present time, being well sold into the third and fourth quarter. Pig iron prices, particularly foundry iron, were forced to abnormal proportions, due to the irregular coke supply and poor freight movement. As a result there is now no fixed market price for foundry iron, and it is likely to go down below bessemer, which heretofore has been its place in the market. Bessemer pig, compared with the fixed prices of finished steel, has been unusually high, and if the reported decline in price had been correct, it would not have affected the general situation. However, there has been no heavy shading in prices, which is indicated by a large sale made yesterday at $19.45, Valley furnace, for delivery in the third quarter. Buyers are still waiting, and furnaces are not disposed to hold out any inducements in order to take on new business as they are sold up for several months ahead. While the furnaces are all in full operation and coke shipments are up to the requirements ,this condition of affairs is not likely to continue. Through the irregular operation during the winter months and the frequent banking necessary on account of lack of coke a number of furnaces are in bad shape, and some will be blown out before long for relining. From present indications there is no certainty that satisfactory coke deliveries will continue. With the exception of the sale of bessemer yesterday there have been no sales of any consequence for over a week. A few days ago it was announced that a leading steel interest had bought 14,000 tons about two weeks ago, paying the market price. But little information as to the meeting of the Pig Iron Committee of the United States Steel Corporation last Tuesday has been made public. Some offers of bessemer for May and June delivery were considered, but so far as known no purchases were made. It is believed the Corporation will buy from 100,000 to 150,000 tons of bessemer for second-half delivery in a short time. When the matter of iron for the last half was under consideration about two months ago the lowest price at which it could be had was $20. Now a large tonnage could be placed at probaly $19, Valley furnaces.

There is practically nothing doing in bessemer or open-hearth billets, because it is impossible to get prompt deliveries. The absurd report, said to have emanated from Pittsburg, that billets had been cut $1 and $2 a ton, and that a buyer had offered $28 a ton for a year's supply, may have had some effect on the stock market, but not on the steel market. No large consumer would contract for a year's supply of billets at a flat price. Sales of this kind are invariably made on a sliding scale based on the price of pig iron. Prices of rails, plates, bars, sheets and all other lines of finished steel have been strictly maintained, and will continue to be as the capacity of the mills has been sold into the third quarter. Premiums on steel plates have disappeared, but are still being paid on tin-plate.

Arrangements have just been completed for the conference on the new iron scale to go into effect on July 1. It will be held in Detroit on Tuesday, May 26. The committee of the Amalgamated Association of Iron, Steel and Tin Workers has not yet been appointed. The Republic Iron and Steel Company will be represented by James H. Nutt, W. L. Simonton and G. Watson French. While the company has a large tonnage booked it is not believed the advance asked by the workers will be conceded. Bar iron prices continue high, which was shown by the bi-monthly examination of sales sheets last week, the average price being 1.7c. a pound, which continues the puddling rate of $6.12½ a ton. Under the proposed scale of the Amalgamated Association the puddling rate would be $6.75 a ton. The conference on the tin-plate scale, which began at the headquarters of the American Tin-Plate Company in New York last Tuesday, is still on, and while no official announcement has been made as to the progress so far it is confidently believed that a satisfactory settlement will be reached.

Pig Iron.—There s but little movement in pig iron. Consumers are still waiting and furnaces are not trying to tempt buyers by making price concessions. The market is consdered strong. One sale was made yesterday of bessemer iron for delivery in the third quarter, the price being $19.45, Valley. No quotaton is given for fourth quarter, but t is likely that $19 could be done or $19.15, Valley, for deliveries extending throughout the last half. There has been no buying in foundry iron, and prices are declining| Northern No. 2 could probably be had at $21, Pttsburg, or a shade lower on a good order. Gray forge is held at $20@$20.25 for Northern and $19.85 for Southern, delvered at Pittsburg.

Steel.—There is no change in the price of bllets, bessemer being held at $31@$31.50, and open-hearth a shade higher, delivered at Pittsburg. There is no sign of weakness in any finished line. Steel bars and plates are still quoted at 1.60c., and premiums on plates have disapeared.

Sheets.—The sheet mills that have a steel supply are all busy ,and on orders for prompt shpment premiums of about $3 a ton are being paid. The leading producer contnues to quote No. 28 gauge black sheets at 2.75c., and galvanized at 3.75c.

Ferro-manganese.—The market is unchanged, and the English product continues to sell at $50@$52.50.

BY TELEGRAPH.

PITTSBURG, May 21.—The Bessemer Furnace Association, at the secret meeting this week, it is reported, fixed the price of bessemer pig for second-half delivery at $19 per ton at furnace, for large lots. Heavy purchases are expected shortly.

St. Louis. May 18.

(From Our Special Correspondent.)

Pig Iron.—No buyers, no sellers. Iron users throughout the valley are inclined to take their chances during the present price upheaval, and are waiting for more concessions. The price of $16.50, Birmingham, still holds for large-sized orders, but for quick shipment agents generally quote $17 for car-lots or small orders. Stocks in nearly all foundry yards are very low, and there is doubt that the large interests are negotiating for supplies that will cover their second half requirements. We quote, f.o.b. East St. Louis: Southern No. 1 foundry, $21.25@$21.75; Southern No. 2 foundry, $20.25@$20.75; gray forge, $18.75@$19.75.

Finished Material.—If the anticipations for lower prices for pig iron are realized there is a foreshadowing for lower prices in finished material. Notwithstanding this, however, all prices in this market continue firm, and there has not come to the surface as yet the slightest indication of any pronounced shading. Jobbers are reporting a fair volume of trade in iron and steel bars. For material of this class they are getting 2.75@2.25c., according to size of order. The South and Southwest are purchasing large quantities of rail and track supplies on a base of splice bars at 2.30c.

Old Material.—Steel scrap commands good prices, and is in brisk demand. In other lines there is a slight slump, middlemen and small dealers having large stocks on hand. The easiness in pig metal is being reflected in iron scrap prices.

New York. May 21.

Pig Iron.—The market continues sluggish. We quote for early delivery, Northern iron at tidewater: No. 1X foundry, $21; No. 2X, $20.25; No. 2 plain, $19.50. For Southern iron on dock, New York: No. 1 foundry, $20.50; No. 2, $20; No. 3, $19.50.

Bar Iron and Steel.—We continue to quote for large lots on dock: Refined bars, 1.90c.; soft steel bars, 1.80@1.90c.

Plates.—Local demand is, all things considered, very good. Sheared plates are quoted: Tank, ¼-in. and heavier, at 1.90@2c.; flange, 2@2.05c.; marine, 2.10@2.20c.

Steel Rails.—The quotation remains $28 for standard sections, f.o.b. mills for 1903 delivery; light rails, $33@$36, according to weight. Relaying rails are $28@$30 for heavy sections and $33@$35 for light sections.

Structural Material.—Demand has picked up somewhat. We quote for large lots at tidewater: Beams, angles, channels and tees, 1.75@2c.

Cartagena, Spain. May 2.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—During the week shipments were made of 6 cargoes, 18,610 tons dry ore, and of 4,750 tons magnetic ore. This makes a total of 130,110 tons up to date. The prices of iron and manganiferous ore continue firm, and there is considerable demand for forward shipments, both for the United States and Europe. Since our last report we are pleased to state that the strike of the dock laborers was brought to a satisfactory termination, the men having resumed work on the old terms, and since Tuesday last all steamers in the port have been working.

Prices are firm at 6s. 9d.@7s. per ton, f.o.b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites, 43 per cent sulphur and 40 per cent iron, are quoted at 10s. 6d. per ton. No shipments are reported for the week.

CHEMICALS AND MINERALS.

New York, May 20.

The quiet season is approaching; in fact, judging from the willingness of sellers to shade prices new business is already scarce. The contract for 5,000 lb. sal soda for the United States Quartermaster's stores at New York was recently let to Messrs. Leon Hirsh & Son, of this city, at 0.779c. per lb.

The affairs of the salt combination are being adjusted by the public sale of the properties of the National Salt Company. The asphalt combinations, having recently disposed of their assets at auction, will likely be reorganized. Seems the consolidations that were formed in the early stages of the boom, when large capitalizations represented the extravagant ideas of the promoters rather than the intrinsic worth of the properties, are about to learn the error of their policy. And still new combinations are being planned, but it is noticeable that they are reversing the tactics of their predecessors by devoting more attention to the economical management of their business. The latest aggregation is the powder and dynamite trust, which is being supported by the leading manufacturers, headed by the E. I. Dupont-de Nemours Company. It is intimated that three of the largest works supplying the anthracite coal mines have been secured, and negotiations for others are pending. Such a combination, however, will not create a sensation, as it has been known for some time that the prominent manufacturers of explosives have maintained prices according to a gentlemen's agreement.

Abrasive dealers are discussing the future situation in pumice stone as a result of the export duty imposed by the Italian Government and the probable agreement among producers. The Lipari Islands, near Sicily, supply the greater part of the world's demand. In recent years, however, more attention has been paid to the development of American mines, notably in Utah, but the output is still insufficient to meet consumption.

Cyanide of Potassium.—Trade is quiet, and the f.o.b. price at New York remains at 20c. per lb. Recently 15 tons of cyanide were shipped from London to New Orleans, the f.o.b. value being £1,500, or about 21c. per lb.

Bleaching Powder and Chlorine.—Sellers are perplexed, not knowing how low the market for bleaching powder may drop. Already 75c. per 100 lbs. has been quoted for domestic, f.o.b. works, and $1 for foreign for shipment to New York. Of course, these prices are for an article of varying test, but they nevertheless show how keen competition is. Prime bleach has sold at $1.12½, f.o.b. domestic works, and $1.15@$1.20 for foreign in New York. The exports of bleaching powder from Great Britain in April and the four months of this year are shown below, and an approximation is also given of the chlorine content, in pounds:

	April.	Four months.
Bleaching powder	10,091,536	43,983,968
Chlorine content	3,532,038	15,394,389

The average f.o.b. value of these exports was about as follows, per 100 lbs.:

	April.	Four months.
Bleaching powder	$0.85	$0.86
Chlorine	2.43	2.46

The exports for the four months ending April 30 show an increase of 6,583,808 lbs., or 17.7 per cent, as compared with the corresponding period last year. Prices, however, have fallen considerably since the termination of the agreement among foreign manufacturers.

Chlorine trade is uninteresting, and prices remain at 30c. per lb. in New York for imported liquor, and 10c. for domestic water.

Copper Sulphate.—The market is easier at $5@$5.12½ per 100 lbs. for domestic, and $5.12½@$5.25 for foreign. Advices from Greece state that the Patras Bank has purchased about 650 tons of copper sulphate, of which 200 tons will be furnished by Great Britain at £21 10s., c.i.f. Patras. This is equivalent to $104.46 per ton, which is about $15 more than was paid a New York firm a year ago. Greece consumes annually between 2,000 and 3,000 tons as an insecticide for its vineyards. The exports from Great Britain to all countries show a substantial increase this year, primarily because Americans are inclined to withdraw.

Exports of copper sulphate from New York in April amounted to 1,447,914 lbs., making a total of 11,102,954 lbs. since January 1. Compared with the corresponding four months last year there is a decrease of 8,432,636 lbs., or about 43 per cent. The average value of this year's exports was $4.02½ per 100 lbs., as against $3.97½ in 1902; showing an increase of 5c. per 100 lbs. Our largest customer this year was Italy, which ordered 6,910,845 lbs., as against 12,541,904 lbs. in 1902; a decrease of 5,631,059 lbs., or nearly 45 per cent.

In April Great Britain shipped 10,493 long tons, making a total of 34,613 tons since January 1. Compared with the corresponding four months last year there is an increase of 9,810 tons, or 39.6 per cent. The average f.o.b. value of these exports is equivalent to $92.26 per ton, against $96.55 last year; showing an increase of $4.29.

Acids.—There is little doing in commercial acids, and prices are nominally unchanged. We quote per 100 lbs., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°..	$1.50	Oxalic com'l...	$5.25@$5.50
Muriatic, 20°..	1.60	Sulphuric, 50°,	
Muriatic, 22°..	1.75	bulk, ton....	13.50@14.50
Nitric, 36°....	4.37½	Sulphuric, 60°.	1.05
Nitric, 38°....	4.75	Sulphuric, 60°,	
Nitric, 40°....	5.00	bulk, ton	18.00@20.00
Nitric, 42°....	5.37½	Sulphuric, 66°,	1.20
		bulk, ton	21.00@23.00

Brimstone.—Dull, notwithstanding the willingness of sellers to accept $22.25 per ton for spot best unmixed seconds, and $22@$22.25 for shipments. Best thirds are about $1 less than seconds.

The imports of brimstone into Great Britain in April were 1,478 tons, making a total of 5,930 tons since January 1, against 8,346 tons last year; showing a decrease of 2,416 tons, or about 29 per cent.

Sicilian Brimstone Market.—Messrs. Emil Fog & Sons, of Messina, write under date of April 30 that the market did not change during the month. A few sellers of small lots operated at 6d.@9d. less, but for large quantities the Anglo-Sicilian Sulphur Company is the only seller and upholds prices. Another large pulp manufacturer, the Crollwitz Chemical Company, near Halle, has changed to pyrites. The cost of changing to a pyrites burning plant is about £6,000. The fall in the value of paper is rendering the change almost necessary. However, there is one consolation, the consumption of sulphur has doubled within five years. We quote, f.o.b., as follows: Best unmixed seconds in bulk, 83s. per long ton; best thirds, 79s. 3d.; current thirds, 78s. 6d.; refined block, 87s. 6d.@91s.; refined roll, 94s.@98s. 9d., and in sticks, 103s. 6d.@105s. 9d.; sublimed flowers, pure, 107s. 6d.; current, 99s., and commercial flowers, 94s. 6d. Freight rates show no improvement, though steamers are getting scarcer. Ballast lots to New York are quoted 7s. 3d.; Baltimore, 7s. 9d.; Philadelphia, 8s. Whole steamers to any of these ports may be had at 7s.; to two ports, 7s. 6d. To Portland, 7s. 6d., and Canadian ports, 8s. and 8s. 6d.

Pyrites.—Imports continue heavy, especially of iron pyrites from Spain. Deliveries are on contract, little new business being done. Prices are unchanged.

Imports of pyrites into Great Britain in April and the four months this year, and an approximation of the sulphur content, are shown below, in long tons:

	April.	Four months.
Pyrites	62,691	258,947
Sulphur content	29,465	121,705

Compared with the same four months last year, there is an increase in pyrites of 40,263 tons, or about 19 per cent.

We quote: Domestic pyrites, $5 per ton for lump ore, f.o.b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44 per cent. Spanish pyrites, carrying from 46@52 per cent sulphur, are quoted at 11@12c. per unit for lump and 10@10½c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—Conditions favor a higher market. Spot has sold at $2.10@$2.15 per 100 lbs., to arrive, $2.05, and futures, $1.95@$2. Estimates gives the shipments to Europe this month at 600,000 qtls., and to the United States, 250,000 qtls., while loading on June 1 will be 600,000 for Europe, and nothing for the United States. Ocean freight rates from Chile to the United States are now 18s. 9d. ($4.50), which are the highest in eight months. The *Condor* arrived at New York this week with 29,289 bags.

The statistical position of nitrate of soda in Europe in April and the four months of this year, is shown below, in long tons:

	April.	Four months.
Exports to Europe	54,682	308,810
Imports	105,010	499,650
Deliveries	147,170	659,500

Loadings in Chile for Europe, May 1, amounted to 50,423 tons—the largest quantity since January. The visible supply, including stocks and cargoes afloat on May 1, was 301,510 tons, which is the smallest quantity reported since the organization of the producers' combination. It is also interesting to note that the deliveries in the four months ending April 30, 1903, are extraordinary, showing an increase of 108,950 tons, or nearly 20 per cent, as compared with the corresponding period last year. They are, however, somewhat less than was reported in 1901.

Chilean Nitrate of Soda Market.—Messrs. Jackson Brothers, of Valparaiso, write under date of April 4 as follows: There has been no interest shown by exporters to operate in the 95 per cent quality, and only a few small parcels have changed hands for prompt

delivery at 6s. 4½d., alongside. On the other hand, producers are by no means free sellers, and the majority ask 6s. 5d., alongside, for any delivery this year. For the refined quality, however, a fair demand is still shown at 6s. 7¾@6s. 8d., alongside, for April to July, and 6s. 7½d., alongside, for later dates. For what is termed the nitrate year or period from April, 1902, to March, 1903, the estimated figures of the production are 31,200,000 qtls.; exports, 29,500,000 qtls., and consumption, 31,500,000 qtls. In the previous years the production was 28,467,000 qtls.; exports, 28,730,000 qtls., and consumption, 29,770,000 qtls. We quote: 95 per cent, April to May, 6s. 4d.@6s. 4½d.; June to September, 6s. 4½d.; October to December, 6s. 4½d.@6s. 5d., and refined, April to July, 6s. 7½d., all ordinary terms sellers. The price of 6s. 4d., with an all-round freight of 14s. 6d., stands in 7s. 9d. per cwt., net cost and freight, without purchasing commission. Reported sales for the fortnight are 201,000 qtls., and re-sales, 33,000 qtls.

Sulphate of Ammonia.—Gas liquor of good quality can be bought at $3.12 per 100 lbs.

Phosphates.—Heavy rains in Florida have interrupted mining and railroad transportation, and washouts have been frequent in various parts of the State. Fortunately the storm lasted only a few days, otherwise the phosphate plants might have been destroyed entirely.

The report that Messrs. Buttgenbach & Co. had purchased the hard rock mines of the Dunnellon Phosphate Company is denied by those who are in a position to know. Apparently the report gained currency from the fact that consolidations in Florida are now frequent. It is learned that Messrs. Buttgenbach & Co., besides being largely interested in Florida, have optioned good phosphate land in Tennessee.

With regard to the foreign phosphate industry it is learned that the African mines are doing their utmost to increase production, while the new deposits in other localities, notably on Christmas and Ocean Islands, are being worked energetically. The shipments from Bone, Algeria, in March amounted to 21,977 tons, making a total of 64,165 tons for the three months of this year. The Constantine Phosphate Company was the principal shipper, and Germany and Great Britain were the largest buyers.

Discoveries of new phosphate deposits abroad are frequently of no other importance than putting on record for historical reference. Occasionally good land is found, and the latest is an island to the northeast of the Solomon Islands, in the Indian Ocean. This mineral carries up to 86.15 per cent tribasic phosphate of lime, and it is claimed, only 0.68 per cent iron and alumina. A sample cargo was sent to Germany recently.

Phosphates	Per ton F. o. b.	United Kingdom or European Ports. Unit.	Long ton.
*Fla. hard rock (77@80%)	$7.00@$7.50	7@7½d.	$10.99@11.77
*Fla. land peb. (68@73%)	3.50@ 3.75	5½@5¾d.	7.70@ 8.05
†Tenn., (78@82%) export.	3.75@ 4.00	6½@7d.	10.40@11.20
†Tenn., 78% domestic	3.50@ 3.75	.....	.....
†Tenn., 75% domestic	3.25	.....	.....
†Tenn., 73@74% domestic	2.70@ 2.95	.....	.....
†Tenn., 70@72% domestic	2.45@ 2.70	.....	.....
‡So. Car. land rock	....@ 3.25	.....	.....
‡S. Car. riv. r'k (55@60%)	2.75@ 3.00	5⅛@5⅝d.	5.95@ 6.24
Algerian (63@70%)	.....	5¼@6⅛d.	6.83@ 8.02
Algerian (58@63%)	.....	5⅛@6d.	6.15@ 7.26
Gafsa (Tunis)	.....	5⅛@6d.	6.15@ 7.26
Christmas Is. (80@85%)	.....	7¼@7¾d.	12.04@12.87

* Fernandina, Tampa, Brunswick or Savannah.
† Mt. Pleasant. ‡ On vessels, Ashley River.

Liverpool. May 5.

(*Special Report of Joseph P. Brunner & Co.*)

There is no improvement to report in the demand for heavy chemicals, and new business is coming in very slowly.

Soda Ash is well controlled. For tierces the nearest range is about as follows: Leblanc ash, 48 per cent, £5 15s.@£6; 58 per cent, £6 2s. 6d.@£6 7s. 6d. per ton, net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces.

Caustic Soda is rather quiet, as follows: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching Powder is practically unsaleable at the moment, buyers being filled up, and quotations are nominal at about £3 10s.@£4 5s. per ton, as to market.

Chlorate of Potash is quiet, at 3d. per lb.

Sulphate of Ammonia is weak, being about £13 2s. 6d.@£13 5s. per ton, less 2½ per cent for good gray 24@25 per cent in double bags, f.o.b. here.

Nitrate of Soda is quiet on spot but firm at £9 15s. @£10 per ton, less 2½ per cent for double bags, f.o.b. here, as to quality.

METAL MARKET.

New York, May 21.

Gold and Silver Exports and Imports.

At all United States Ports in April and Year.

Metal	March. 1902.	March. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports	$2,844,204	$1,705,516	$17,916,305	$4,331,627
Imports	1,844,767	1,106,135	7,603,834	9,137,801
Excess.	E $979,437	E. $599,381	E. $10,312,471	I. $4,806,174
Silver:				
Exports	$3,740,777	$2,619,472	$15,492,663	$13,727,151
Imports	2,051,251	1,616,067	8,471,074	6,676,810
Excess.	E. $1,689,526	E. $1,003,405	E. $7,021,589	E. $7,050,34

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending May 20, and for years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess, Exports or Imports.
Week	$1,826,181	$47,574	$1,410,755	$117,421	E. $3,071,941
1903	5,763,129	2,862,973	7,911,430	817,522	E. 9,994,054
1902	16,455,601	1,072,879	11,995,142	477,708	E. 26,899,556
1901	18,888,997	1,095,548	14,082,735	1,633,298	E. 30,192,886

The gold exported this week went chiefly to Paris, the Silver to London and Manila. Imports were principally from Mexico.

Financial Notes of the Week.

General business shows comparatively little change; if anything, matters are quieter, and there is an evident disposition to take things somewhat easier. The numerous strikes pending are affecting trade, and every one is anxious to see some disposition made of these labor troubles. The gold exports, which began last week, and which amounted altogether to over $5,000,000, of which $1,500,000 went to Argentine Republic, have been continued this week, and up to the present writing about $4,350,000 in gold has been taken for shipment to Paris.

Exports of merchandise from the United States in April were valued by the Bureau of Statistics of the Treasury Department at $109,542,636; being $22,551,328 less than in March, but $372,763 more than in April, 1902. For the 10 months of the fiscal year from July 1 to April 30 the statement is as follows:

	1902.	1903.
Exports	$1,190,157,387	$1,223,740,663
Imports	754,516,807	864,720,889
Excess, exports	$435,640,580	$359,019,774
Add excess of exports, silver		20,086,839
Total		$379,106,613
Deduct excess of imports, gold		20,413,354
Apparent balance of exports		$358,693,259

The gold and silver movement in detail will be found at the head of this column.

The statement of the New York banks, including the 56 banks represented in the Clearing House, for the week ending May 16, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts	$873,512,100	$879,029,900	$928,939,200
Deposits	951,626,700	936,273,200	920,835,500
Circulation	31,109,000	31,273,200	44,269,900
Specie	176,889,100	168,825,800	168,756,400
Legal tenders	74,317,500	73,561,200	70,445,100
Total reserve	$251,206,600	$242,387,000	$239,201,500
Legal requirements	237,906,675	234,040,475	230,208,875
Balance surplus	$13,299,925	$8,346,525	$8,992,625

Changes for the week, this year, were increases of $5,859,000 in loans and discounts, $5,000,800 in deposits, $321,000 in circulation, and $508,300 in legal tenders; decreases of $295,300 in specie, and $1,037,200 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings at the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd.	$168,825,800	.....	$168,756,400	.....
England	176,802,730	.....	176,874,810	.....
France	513,622,255	$222,159,005	497,226,430	$222,450,750
Germany	196,790,000	68,675,000	163,265,000	57,380,000
Spain	70,550,000	92,030,000	72,520,000	100,740,000
Neth'l'ds	23,910,000	33,068,000	19,674,500	32,508,000
Belgium	16,056,665	8,028,335	15,666,665	7,833,335
Italy	80,740,000	10,777,500	88,680,000	11,292,000
Russia	355,835,000	40,015,000	384,670,000	42,800,000

The returns of the Associated Banks of New York are of date May 16, and the others May 14, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has continued firm this week, with rising tendency. Spot silver continues to be in demand, and at a premium over forward delivery. India has been a moderate buyer.

The United States Assay Office in New York reports receipts of 101,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to May 7 are reported by Messrs. Pixley & Abell's circular, as follows:

	1902.	1903.	Changes.
India	£2,839,085	£2,610,000	D. £229,085
China	16,500	168,156	I. 151,656
The Straits	250	148,391	I. 148,141
Total	£2,855,835	£2,926,547	I. £70,712

Receipts for the week were £80,000 in bar silver from New York, £10,000 from Australia and £1,000 from New Zealand; and £40,000 in Mexican dollars from America; total, £131,000. Shipments were £24,500 in bar silver to India and £30,075 to China; total, £54,575.

Indian exchange has been steady, with a somewhat better demand for remittances. Council bills in London sold freely at an average price of 15.94d. per rupee. Very little silver is now reported taken for India.

The foreign merchandise trade of Great Britain for the four months ending April 30 is valued by the Board of Trade returns as follows:

	1902.	1903.	Changes.
Imports	£178,841,736	£177,385,167	D. £1,456,569
Exports	113,244,186	120,177,102	I. 6,932,918
Excess, imports	£65,597,550	£57,208,065	D. £8,389,485

The movement of gold and silver for the four months is reported as follows:

	1902.	1903.	Changes.
Gold:			
Imports	£6,224,359	£8,482,936	I. £2,258,577
Exports	3,876,587	4,736,265	I. 859,678
Excess, imports	£2,347,772	£3,746,671	I. £1,398,809
Silver:			
Imports	3,183,453	3,132,598	D. 50,855
Exports	3,837,350	3,714,901	D. 122,449
Excess, exports	£653,897	£582,303	D. £71,594

Of the silver imported this year £2,680,790, or 89 per cent of the total, was from the United States.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$.43	$.45
Peruvian soles and Chilean pesos	.39	.42
Victoria sovereigns	4.85	4.88
Twenty francs	3.86	4.88
Twenty marks	4.74	3.80
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

May	Sterling Exchange	Silver N. Y. Cts.	Copper London. Pence.	Copper Lake, Cts. per lb.	Copper Electrolytic, Cts. per lb.	Copper London, £ per ton.	Tin, Cts per lb.	Lead Cts. per lb.	Spelter N. Y. Cts. per lb.	Spelter S. L., Cts. per lb.
14	4 87⅜	54½	25	14½ @14¾	14⅜ @14½	62⅝	29⅞	4.30 @4.35	5.65	5.50
15	4.88	54½	25⅛	14½ @14¾	14⅜ @14½	62⅝	30	4.30 @4.35	5.65	5.50
16	4 87⅜	54⅝	25⅛	14½ @14¾	14⅜ @14½	....	29⅞	4.30 @4.35	5.65	5.50
18	4.87⅜	54⅝	25⅛	14½ @14¾	14⅜ @14½	63	29¾	4.30 @4.35	5.65	5.50
19	4.88	54¾	25⅛	14½ @14¾	14⅜ @14½	62½	29⅝	4.30 @4.35	5.65	5.50
20	4.88	54¾	25⅛	14½ @14¾	14⅜ @14½	62½	29⅝	4.30 @4.35	5.65	5.50

London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures

Copper.—The market has been very quiet indeed, and a regular midsummer dullness has prevailed throughout the week. Both producers and consumers continue to assume a waiting attitude, especially in view of the uncertainty of the labor situation. Under the circumstances, values are more or less nominal. The ruling quotations are given as 14½@14¾c. for Lake copper; 14⅜@14½c. for electrolytic in ingots, cakes and wirebars; 14⅛@14¼c. in cathodes; 14c. for casting copper.

The market for standard copper, which closed last week at £62 2s. 6d., opened on Monday at £63, and the closing quotations on Wednesday are cabled as £62 10s.@£62 12s. 6d. for spot, £62@£62 2s. 6d. for three months.

Statistics for the first half of May show a decrease in the visible supplies of 1,500 tons.

Refined and manufactured sorts we quote: English tough, £65@£66; best selected, £66@£66 10s.; strong sheets, £75@£76; India sheets, £72 10s.@£73 10s.; yellow metal, 6¼@6⅜d.

Exports and imports of copper at New York, Philadelphia and Baltimore in the week ending May 19, and for the year to date, are reported by our special correspondents as follows, in long tons:

Exports:	Week.	Year.
Austria	....	2,411
Belgium	8	789
France	89	9,155
Germany	235	10,099
Holland	770	16,242
Italy	55	1,135
United Kingdom	205	6,400
Other countries	90	2,247
Total copper	1,452	48,478
Matte	38	136
Imports:		
Copper	1,226	8,893
Matte	....	464

Exports this week show a falling off, but imports are larger. Of the imports 752 tons were from Great Britain ,and 303 tons from France, the remainder being from Mexico and South America.

Imports and exports of copper in Great Britain, for the four months ending April 30, are reported as below, in long tons; the totals showing the approximate equivalents in fine copper:

	1902	1903.	Changes.
Copper ore	33,981	29,596	D. 4,385
Matte and precipitate	28,926	25,439	D. 3,487
Fine copper	40,525	21,401	D. 19,124
Totals, fine copper	58,386	37,081	D. 21,305
Exports	17,295	18,900	I. 1,605
Net imports	41,091	18,181	D. 22,910

Of the imports this year, 180 tons ore, 1,697 tons matte, and 7,086 tons fine copper were from the United States; against 286 tons ore, 8,647 tons matte and 24,298 tons fine copper last.

Tin.—The heavy speculative dealings reported from abroad have so far remained without effect on our market, consumers evincing little interest beyond their actual requirements. While last week 30c. was paid, values have in the meantime given way again, and we quote at the close spot at 29⅝c.; futures at 29⅜@29½c.

The foreign market, which closed last week at £135 12s. 6d., opened on Monday at £134 7s. 6d., declined on Tuesday to £133 10s., and the closing quotations are cabled as £134@£134 2s. 6d. for spot, £133@£133 2s. 6d. for three months.

Imports of tin into Great Britain, with re-exports of foreign tin, were as follows for the four months ending April 30, in long tons:

	1902.	1903.	Changes.
Straits	7,876	7,122	D. 754
Australia	1,102	1,372	I. 270
Other countries	1,224	772	D. 452
Total, imports	10,202	9,266	D. 936
Re-exports	7,299	7,706	I. 407
Balance	2,903	1,560	D. 1,343

Most of the tin credited to other countries come from Bolivia. The larger part of the re-exports were to the United States.

Lead remains quiet but steady. The closing quotations are 4.17½@4.27½c., St. Louis; 4.30@4.35c., New York.

The foreign market has again declined, Spanish lead being quoted at £11 10s.@£11 12s. 6d.; English lead at £11 12s. 6d.@£11 15s.

Imports and exports of lead in Great Britain for the four months ending April 30 were as follows, in long tons:

	1902.	1903.	Changes.
United States	20,903	12,905	D. 7,998
Spain	63,816	33,504	D. 312
Australia	22,600	21,609	D. 991
Other countries	4,965	6,944	I. 1,879
Total imports	82,284	74,962	D. 7,322
Exports	10,401	9,583	D. 818
Balance	71,883	65,379	D. 6,504

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is steady. Missouri brands are selling in a limited way at 4.15@4.17½c. Desilverized lead is held at 4.27½c.

Our special correspondent reports receipts of lead by the St. Louis Merchants' Exchange at 65,725 bars; shipments, 59,980 bars.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 2, that production of zinc ores is increasing, and if development continues this mineral will take a leading place in the industry. Prices, however, are somewhat flat, owing to weakness in the spelter market. Shipments for the week have been 5,198,700 kgs. blende to Antwerp.

Spelter.—The market has displayed considerable strength, and values are well maintained. The closing quotations are 5.50c., St. Louis; 5.65c., New York.

The foreign market is rather dull and depressed, good ordinaries being quoted at £20 15s.; specials at £21.

Imports and exports of spelter in Great Britain for the four months ending April 30 were as follows, in long tons:

	1902.	1903.	Changes.
Imports	27,887	28,469	I. 582
Exports	2,980	2,750	D. 230
Balance	24,907	25,719	I. 812

The imports were chiefly from Germany and Belgium. In addition to the imports of spelter, there were 7,461 tons of manufactures of zinc imported, against 7,486 tons last year.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter is strong and fairly active. For prompt and May deliveries, 5.50c. is asked; for June and July, 5.45c. nominally.

Our special correspondent reports receipts of spelter for the week by the St. Louis Merchants' Exchange at 39,560 slabs; shipments, 37,375 slabs.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 2, that the price of silver during the week has been 13.25 reales per oz. Exchange has gone down, making it 34.15 pesetas to £1. Local quotation for pig lead on wharf has been 67.75 reales per quintal, which on current exchange is equal to £11 2s. 1d. per long ton, f.o.b., Cartagena. Exports of pig lead for the week were 339,476 kgs. to Marseilles.

Antimony is unchanged. We quote Cookson's at 8@8¼c.; Hallett's, 6¾c.; Hungarian, French, Italian, United States and Japanese at 6½c.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72½c. per gram.

Quicksilver.—The New York price is unchanged at $47.50 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotation is still $44.50@$46 per flask for domestic orders, and $42@$43 for export. The London price is £8 12s. 6d. per flask, with the same quotation asked by second hands.

Imports of quicksilver into Great Britain, with re-exports of foreign metal, were as follows for the four months ending April 30, in pounds:

	1902.	1903	Changes
Imports	1,265,321	1,607,764	I. 342,443
Re-exports	651,983	689,760	I. 17,777
Net imports	613,338	938,004	I. 924,666

The larger part of the metal imported is from Spain.

Minor Metals and Alloys.—Wholesale prices, f.o.b. works, are as follows:

Aluminum.	Per lb.
No. 1, 99% ingots	33@37c.
No. 2, 90% ingots	31@34c.
Rolled Sheets	4c. up
Alum-bronze	20@22c.
Nickel-alum	33@39c.
Bismuth	$2.10
Chromium, pure (N.Y.)	80c.
Copper, red oxide	50c.
Ferro-Molyb'um (50%)	$1.25
Ferro-Titanium (10%)	90c.
Ferro-Titanium (20@25%. N. Y.)	55c.

	per lb.
Ferro-Tungsten (37%)	28c.
Magnesium	$2.75
Manganese, pure (N.Y.)	60c.
Mangan'e Cop. (20% Mn)	32c.
Mangan'e Cop. (30% Mn)	38c.
Molybdenum (Best)	$1.82
Phosphorus	45c.
American	70c.
Sodium metal	50c.
Tungsten (Best)	62c.

Variations in prices depend on size of orders, deliveries, etc.

Missouri Zinc Ore Market. May 9.

(From Our Special Correspondent.)

The highest zinc ore price of the week was $40 per ton, a number of bins in Joplin and other camps of the district bringing this price. The assay basis ranged from $35 to $37 per ton of 60 per cent zinc. One year ago the highest price paid for zinc was $35 and for lead $44.50 per ton.

Considerable zinc ore is being withheld from the market on acount of lower offerings, the producers feeling firm in the belief that the ore market will recover soon. The New York spelter market, which is given most credence as a trade indicator, has been steady during recent fluctuations in the St. Louis market. Added to this is the short output of ore this year, estimated to be 16,000 tons behind the same period of last year, and the decreased production of spelter. Three blocks at the works of the Lanyon Zinc Company and three blocks of the Prime Western Spelter Company are out of commission, ostensibly on account of labor troubles. There is no surplus ore in this district, and there should be no surplus metal.

Following are the sales of zinc and lead from the various camps of the Joplin District for the week ending to-day:

	Zinc. Pounds.	Lead. Pounds.	Total Value.
Joplin	2,388,970	264,710	$52,537
Webb City & Carterville	1,489,090	414,900	37,161
Galena-Empire	821,100	82,840	16,605
Aurora	754,080	15,100	12,572
Duenweg	378,850	121,040	10,249
Carthage	425,490	13,780	8,673
Oronogo	463,080	.....	8,550
Zincite	393,600	7,360	7,777
Prosperity	322,010	10,100	6,391
Reeds	290,570	.....	5,521
Spurgeon and Spring City	135,980	42,270	3,456
Alba and Neck	162,650	.....	3,172
Cave Spring	111,270	22,410	2,709
Central City	110,070	9,060	2,004
Carl Junction	98,980	.....	1,930
Granby	66,000	.....	1,254
Springfield	60,000	.....	1,200
District total sales	8,471,790	1,003,570	$181,761
Twenty weeks	189,012,950	22,298,970	$3,791,120

Zinc value, the week, $154,768; lead value, $26,993. Zinc value, 20 weeks, $3,181,113; lead value, $610,007.

Average Prices of Metals per lb., New York.

Month.	Tin. 1903.	Tin. 1902.	Lead. 1903.	Lead. 1902.	Spelter. 1903.	Spelter. 1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	30.15	26.32	4.442	4.075	5.349	4.28
April	29.81	27.77	4.567	4.075	5.550	4.37
May	....	29.85	....	4.075	....	4.47
June	....	29.36	....	4.075	....	4.90
July	....	28.38	....	4.075	....	5.27
August	....	28.23	....	4.075	....	5.44
September	....	26.60	....	4.075	....	5.49
October	....	26.07	....	4.075	....	5.39
November	....	25.68	....	4.075	....	5.18
December	....	25.68	....	4.075	....	4.79
Year	....	26.79	....	4.089	....	4.84

Note.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.861c.; for March, 5.174c.; for April, 5.375c.

Average Prices of Copper.

Month.	New York Electrolytic. 1903.	New York Electrolytic. 1902.	New York Lake. 1903.	New York Lake. 1902.	London Standard. 1903.	London Standard. 1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	12.778	12.173	12.901	12.378	57.84	55.16
March	14.416	11.882	14.572	12.188	63.85	53.39
April	14.454	11.618	14.642	11.986	61.72	52.79
May	.....	11.856	.....	12.226	....	54.05
June	.....	12.110	.....	12.360	....	53.90
July	.....	11.771	.....	11.923	....	52.89
August	.....	11.404	.....	11.649	....	51.96
September	.....	11.480	.....	11.760	....	52.69
October	.....	11.449	.....	11.722	....	52.18
November	.....	11.288	.....	11.533	....	51.08
December	.....	11.430	.....	11.599	....	50.95
Year	.....	11.626	.....	11.887	....	52.69

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month.	1903. London. Pence.	1903. N. Y. Cents.	1902. London. Pence.	1902. N. Y. Cents.	1901. London. Pence.	1901. N. Y. Cents.
January	21.98	47.57	25.62	55.56	28.97	62.82
February	22.11	47.89	25.41	55.09	28.13	61.06
March	22.49	48.72	25.00	54.23	27.04	60.63
April	23.38	50.56	24.34	52.72	27.30	59.29
May	....	....	23.71	51.31	27.43	59.64
June	....	....	24.17	52.36	27.42	59.57
July	....	....	24.38	52.88	26.96	58.46
August	....	....	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.95	58.26
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
†Amalgamated Copper	May 25	.50	$769,430	$21,195,540
†Am. Iron & Steel, pf.	June 1	.62½	37,500	562,500
†Am. Steel Foundries, pf.	June 1	1.50	232,500	697,500
Aztec Oil, Cal.	May 13	.02	4,700	25,850
Bartolome de Medina, Mex.	May 30	.63	1,260	70,518
*Bunker Hill & Sull.	June 4	.03	9,000	1,496,000
Calumet & Hecla, Mich.	June 19	10.00	1,000,000	$1,350,000
Camp Bird, Colo.	May 25	.15	123,000	455,100
*Cinco Senores, Mex.	May 30	4.20	8,400	695,135
Copiapo, Chile	May 9	1.64	184,500	3,050,400
Dos Estrellas, Mex.	May 15	12.60	37,800	297,450
*Esperanza, Mex.	June 1	4.20	12,600	1,128,699
†General Chem., common	June 1	1.25	92,629	1,115,279
Golden Cycle, Colo.	May 25	.03	45,000	213,750
Greene Con., Mex.	May 25	.20	144,000	652,000
*Homestake, S. D.	May 25	.25	54,600	11,985,150
*Imperial Oil, Cal.	June 6	.20	20,000	380,000
International Nickel, pf.,	May 26	4.00	380,000	380,000
§Lehigh Coal & Nav.	May 27	1.00	286,933	20,382,053
*Pacific Coast Borax, Cal.	May 30	1.00	19,000	1,312,500
*Peerless Oil, Cal.	June 1	.14	12,880	113,520
*Sacramento, Utah	June 1	.00½	5,000	158,000
*S'ta Gert. y An., Mex.	May 25	.42	12,096	2,714,664
†Standard Oil,	June 15	7.00	6,790,000	190,225,000
*Thirty-Three Oil, Cal.	June 6	.10	10,000	180,000
*Trinity County, Cal.	June 1	.05	5,000	30,000
†U. S. Steel, common	June 9	1.00	5,083,025	45,726,552

* Monthly. † Quarterly.

ASSESSMENTS.

Name of Company.	Location.	No.	Delinq.	Sale.	Amt.
Ajax	Utah	4	June 11	June 29	.05
Ben Butler	Utah	10	June 15	July 2	.00⅛
Carisa	Utah	..	June 2	June 30	.03
Challar	Nev.	62	May 21	June 11	.10
Confidence	Nev.	39	May 19	June 8	.20
Con. Cal. & Va.	Nev.	..	June 2	June 25	.25
Con. St. Gothard	Cal.	..	June 1	.....	.05
Fauna Oil	Cal.	..	May 25	.....	.03
Golden Channel Drift	Cal.	3	May 23	June 20	.01½
Grape Vine Canyon	Cal.	..	June 8	.....	.05
Grizzly	Cal.	..	May 25	.....	.10
Hale & Norcross	Nev.	12	Apr. 30	May 28	.10
Jubilee	Cal.	..	June 1	.....	.05
Justice	Nev.	..	June 8	June 27	.10
Kentucky Con.	Nev.	17	May 6	May 29	.05
La Suerte	Cal.	..	June 3	.....	.02½
Little Chief	Utah	16	June 8	June 25	.01
Marina Marsicano	Cal.	35	May 25	June 15	.05
Martha Washington	Utah	..	May 19	June 8	.01
Mexican	Nev.	74	June 10	July 1	.10
Morgan	Cal.	..	June 16	.....	.05
Mountain Lake	Utah	..	June 8	July 6	.005
National Con.	Cal.	17	May 4	May 30	.05
Old Colony & Eureka	Utah	5	June 11	June 29	.01
Potosi	Nev.	66	May 14	June 4	.10
Rusby	Cal.	..	June 4	.....	.05
Romeo Con.	Utah	..	May 22	June 9	.05
Santa Cruz Lime	Cal.	..	May 4	May 25	75.00
Scorpion	Nev.	..	June 15	July 17	.05

STOCK QUOTATIONS.

NEW YORK.

Company and Location.	par val	May 13. H.	May 13. L.	May 14. H.	May 14. L.	May 15. H.	May 15. L.	May 16. H.	May 16. L.	May 18. H.	May 18. L.	May 19. H.	May 19. L.	Sales
Amalgamated c., Mont	100	66	65⅜	65¾	64½	64⅝	63¼	64⅜	63½	64¼	63½	65	63¾	132005
†Anaconda c. Mont.	25	105	105	104½	103⅜	103¼	102	....	....	101	100	101⅛	101	2,810
Anaconda Gold, Colo.	5	....	....	14	....	....	....	....	....	....	....	....	....	400
Andes, Nev.	1	....	....	....	....	.10	....	....	....	....	....	....	....	700
Argentum, J., Colo.	2	....	....	....	....	....	....	....	....	....	....	....	....	....
Belcher, Nev.	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Best & Belcher, Nev	3	....	....	....	....	1.50	....	....	....	....	....	....	....	100
Brunswick, Cal.	1	11¾	11¾	....	....	....	....	11⅝	11¾	....	....	....	....	810
Caledonia, Nev.	2½	....	....	....	....	....	....	....	....	....	....	1.70	....	....
Challar, Nev.	3	.33	.28	....	....	....	....	....	....	.21	....	.34	....	1,100
C. K. & N., Colo.	1	.20	....	....	....	....	....	....	....	....	....	....	....	2,000
Comstock T., s., Nev.	2	....	....	....	....	....	....	....	....	....	....	.68⅛	.08	....
Comst T. Bonds	100	....	....	....	....	....	....	....	....	....	....	.07½	....	....
Con. Cal. & Va., g. s. Nev	2½	1.35	1.25	....	....	....	....	....	....	....	....	1.15	....	1,600
Cons. Imperial, Colo.	1	....	....	.04	....	....	....	....	....	....	....	....	....	1,000
Cripple Creek c., Colo.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Daly, Utah	20	....	....	....	....	....	....	....	....	....	....	....	....	....
Elkton g., Colo.	1	....	....	.37	.35	....	....	....	....	.35	....	....	....	800
El Paso, Colo.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Golden Fleece, Colo.	1	.15	....	.15	....	....	....	....	....	....	....	.15	....	800
Greene Con., c., Mex.	10	22⅜	22¼	22¼	22¼	22⅛	22¼	22¼	22¼	22	21¾	22½	22	3,700
Homestake, S. Dak.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn Silver, Utah	25	1.30	1.25	....	....	....	....	....	....	....	....	....	....	700
Isabella, g., Colo.	1	.18	....	.18½	....	.18	....	....	....	....	....	.18½	....	2,500
Julia, Nev.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Justice, Nev.	1	.08	.07	....	....	....	....	....	....	....	....	....	....	1,500
Mexican, Nev.	3	....	....	....	....	.80	....	....	....	.78	....	....	....	400
Mollie Gibson, Colo.	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Ontario, Utah	100	5.75	....	....	....	....	....	....	....	....	....	....	....	10
Ophir, s., Nev	1	....	....	1.60	....	1.45	....	....	....	1.50	....	....	....	1,000
Pharmacist, Colo.	1	03½	....	.03½	....	....	....	....	....	.03½	....	....	....	2,100
Portland, Colo.	10	1.40	....	1.40	....	....	....	....	....	1.38	....	....	....	500
Potosi, Nev.	3	.33	....	.29	.28	....	....	....	....	....	....	.25	....	1,300
Quicksilver, Cal.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Nevada, Nev	3	....	....	.75	....	....	....	....	....	....	....	....	....	100
Silver Hill, Nev	1	1.05	....	....	....	1.50	1.30	....	....	1.30	....	....	....	500
Small Hopes, Colo.	20	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard, Cal.	10	....	....	....	....	....	....	....	....	....	....	....	....	....
Tenn. c., Tenn	25	28¾	28⅛	28⅛	28⅜	28	28	28¾	28⅛	28⅛	28	28¼	....	1,050
Union Con., Nev.	2½	....	....	....	....	.85	....	....	....	....	....	....	....	....
Union Con., N. C.	10	2	2	2	2	2	2	2	2	....	....	2	....	1,500
Utah Con., Nev.	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Vindicator, Colo.	1	....	....	....	....	.95	....	....	....	....	....	....	....	500
White Knob, g. s., Ida	100	19	17¾	19⅝	18⅜	18¾	16¾	17	16⅛	16⅜	16	16	15¾	21,135
Yellow Jacket, Nev.	3	....	....	....	....	....	....	....	....	....	....	....	....	....

† Ex-Dividend., Total sales 182,020 shares.

BOSTON, MASS.*

Name of Company.	par val	Shares listed.	May 13. H.	May 13. L.	May 14. H.	May 14. L.	May 15. H.	May 15. L.	May 16. H.	May 16. L.	May 18. H.	May 18. L.	May 19. H.	May 19. L.	Sales
Adventure Con., c.	$25	100,000	8¼	8	8½	....	8	....	6¼	6⅛	6⅝	....	6¾	6⅝	288
Allouez	25	59,511	7	6¾	7	6¾	6¾	6⅛	6⅜	6⅛	6⅝	....	6¾	6⅝	1,704
Amalgamated, c.	100	1,538,879	†65⅞	65¾	†65¾	65½	†64⅜	63⅜	64	63¼	64¼	63⅛	†64⅞	63¼	21,238
Am. Z. L. & Sm.	25	60,000	12⅜	12¼	12	11½	11⅝	....	....	....	....	....	11⅜	10½	1,690
Anaconda, c.	25	1,200,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Arcadian, c.	25	150,000	....	....	3⅜	....	3⅜	3¼	....	....	3¼	3	3⅜	3	1,865
Arnold	25	60,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlantic, c.	25	100,000	11¾	....	11¾	....	11¾	10½	....	....	....	....	10½	....	890
Bingham Con., g. s.	50	150,000	30¾	30¼	30¼	31	30¼	30	29¾	29½	29½	29	29¼	28¾	985
British Columbia	5	250,506	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal. & Hecla, c.	25	100,000	....	....	....	....	524	520	....	....	525	520	530	527	42
Catalpa	10	360,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Centennial, c.	25	90,000	25	....	25	24¾	24¼	23⅜	23½	23	23	....	24⅜	24	1,970
Central Oil	25	60,450	....	....	....	....	6¾	....	....	....	....	....	....	....	50
Con. Mercur, g.	5	1,000,000	1 1/16	1 1/16	1¼	1 1/16	1 1/32	1 1/16	1¼	....	1 1/16	1¼	....	....	5,120
Continental Zinc	25	22,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Copper Range Con.	100	285,000	64	63½	63½	62¼	....	....	61¼	60¼	61¼	60¼	62¼	61	8,195
Crescent	10	300,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Daly West, g. s.	20	180,000	....	....	14 7/8	....	14 7/8	47	....	....	47¼	47	....	....	225
Dominion Coal	100	150,000	106⅜	....	....	....	107	105	....	....	104	100½	102	101	2,300
Dominion Coal, pf.	100	30,000	....	....	....	....	....	....	....	....	115½	....	....	....	20
Dominion I & S.	100	100,000	28¼	27⅝	28⅛	27	27	26	26	....	26	22¾	24	21¾	3,770
Elm River	12	150,000	3¾	....	....	....	3¼	....	....	....	3⅛	....	....	....	1,900
Franklin, c.	25	100,000	10¼	....	....	....	10	....	10	....	....	....	....	....	320
Granby, c.	10	1,339,303	5	....	....	....	....	....	....	....	5 1/16	5	5	....	770
Guanajuato Con.	5	385,000	2	....	....	....	....	....	....	....	....	....	....	....	50
Isle Royale Con., c.	25	385,000	10¼	....	10	....	10	....	10	....	9	....	....	....	280
Mason, c.	25	100,000	10¼	....	....	....	10	....	9	....	9	8½	8¾	8	535
Massachusetts, c.	25	100,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Michigan, c.	25	100,000	8	....	....	....	7⅜	....	....	....	7⅛	7	7¼	7	340
Mohawk, c.	25	100,000	52	51½	51	....	52	50	50	....	50	49½	50¼	50	1,243
Monitor Coal & Coke	25	200,000	....	....	6½	....	6	....	....	....	1⅜	1 1/16	1⅜	....	105
Montana Boston, c.	5	570,000	1¾	....	....	....	....	....	....	....	....	....	....	....	450
Nansen	25	100,000	....	....	.75	....	....	....	....	....	....	....	....	....	50
Nevada	5	100,000	....	....	....	....	....	....	....	....	....	....	9	....	600
Old Colony, c.	25	100,000	1⅜	1¼	....	....	....	....	....	....	....	....	....	....	175
Old Dominion, c.	25	150,000	18	....	17⅜	....	....	....	....	....	....	....	....	....	175
Osceola, c.	25	96,150	67	66¼	66	....	66	65¼	....	....	65¼	65	66¾	65¼	778
Parrot, c.	10	229,850	28⅜	....	28¼	....	28	27	27	....	27	26¾	26¾	26½	515
Phoenix Con., c.	25	100,000	6	....	....	....	....	....	6	....	....	....	....	....	97
Quincy, c.	25	100,000	113	....	113	109	109	....	110	....	109	....	....	....	145
Rhode Island, c.	25	100,000	....	....	2⅛	....	....	....	2½	....	2¼	....	....	....	125
Santa Fe, g. c.	10	250,000	....	....	....	....	3	....	2¼	....	2	....	2	....	328
Shannon, c.	10	188,153	13¾	....	13¼	....	13⅜	13¼	....	....	13½	....	13⅜	13	1,345
Tamarack, c.	25	60,000	....	....	....	....	....	....	....	....	120	....	125	....	70
Trimountain	25	100,000	91	....	91¾	89½	89½	....	....	....	....	....	....	....	210
Trinity, c.	25	100,000	9¼	9⅛	8⅝	....	8¼	8¼	8¼	8¼	8¼	8¼	9¼	8	986
United Copper	100	450,000	....	....	....	....	....	....	....	....	....	....	....	....	....
United States, g.	25	419,000	....	....	24⅜	24	24	23¾	23½	23	23¼	22¾	23¼	22⅝	3,825
U. S. Coal & Oil	25	240,000	....	....	14⅛	14	14	....	14	13⅜	13¼	13¼	....	....	1,855
Utah Con., g.	5	300,000	29⅜	29⅛	29¼	29⅛	29	28¾	29	28⅝	29	28¾	29¼	28¼	4,120
Victoria, c.	25	100,000	....	....	5⅛	....	5⅛	....	5½	....	5⅛	....	5 1/16	5⅛	413
Washington	25	60,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Winona, c.	25	100,000	12	11¼	11⅜	10¾	10¾	10¼	10½	10¼	10¾	10¼	11¼	10½	4,520
Wolverine, c.	25	60,000	71	70¾	71	....	70¾	....	70¼	70	71	70	....	....	417
Wyandot	25	100,000	....	....	2	1¾	1¾	....	1¾	....	1¾	1¾	2	1¾	1,290

* Boston Stock Exchange. † Ex Dividend. ‡ Assessment Paid. Total sales, 77,459 shares.

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val	May 13. H.	May 13. L.	May 14. H.	May 14. L.	May 15. H.	May 15. L.	May 16. H.	May 16. L.	May 18. H.	May 18. L.	May 19. H.	May 19. L.	Sales
Allis-Chalmers, U. S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Allis-Chalm's, pf, U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Agr. Chem., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Agr. Chem. pf, U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Sm. & Ref., U.S.	100	50¼	50	50	49½	49⅝	49	49¼	....	49⅛	48⅝	48⅞	48¼	12,220
Am. Sm. & Ref. pf, U.S.	100	95⅛	....	95¼	....	94⅜	....	94⅜	94½	92¾	91⅛	95½	94	2,486
Am. Steel & Fdy., U.S.	100	14	....	....	....	....	....	....	....	....	....	....	....	....
Am. S. & Fdy. pf., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Col. Fuel & I., Colo.	100	70	68¾	70⅞	68¾	69⅛	68	68	67½	68	66¾	....	....	17,075
Col. & H. C. & I., Colo.	100	18½	17⅜	17⅝	17½	18	....	....	....	17⅜	17¼	....	....	700
†Crucible Steel, U. S.	100	18	....	....	....	17⅜	17⅛	17⅝	17⅛	17⅜	17¼	17¼	17¼	800
†Crucible Steel, pf, U S	100	82¾	82⅜	82½	82¼	82¼	82	82	82	82⅛	81⅞	82⅛	81¾	1,683
† Mong. R. Coal, Pa.	100	10⅜	....	10⅜	10¼	10⅜	10⅛	....	....	....	....	....	....	....
† Mong. R. Coal pf, Pa	100	40	....	40	39¾	39¾	39½	....	....	....	....	....	....	....
National Lead, U.S.	100	20⅛	19⅞	20	....	19⅞	19¾	19½	....	20	19⅜	19⅜	19¾	2,000
National Lead pf, U.S.	100	....	....	....	....	....	....	....	....	88	88	....	....	100
†Phila Nat. Gas	100	44¾	44½	....	....	....	....	....	....	....	....	86	86	797
†Phila Nat. Gas, pf	100	....	....	48	....	....	....	....	....	....	....	....	....	82
†Pittsburg Coal, Pa.	100	29⅜	29⅛	29½	29¼	29¾	....	....	....	29¼	29¼	....	....	29¼	29⅛	1,853
†Pittsburg Coal pf, Pa	100	88¾	88	88¾	88	88¾	....	....	....	88⅛	88	88	88	87⅞	608
Republic I & S., U.S.	100	18⅝	18⅛	18¾	18	18⅛	18	....	....	17⅞	17⅜	17⅜	17¼	17	16	3,350
Republic I.&S., pf, U.S.	100	78	77¼	77¼	77	77½	....	....	....	77⅜	77⅛	76⅞	76	76⅞	75¼	2,150
Sloss-Shef S. & I., Ala.	100	58¾	58⅜	58⅝	....	58	57	....	....	....	....	57	53⅜	55½	53¼	2,050
Sloss-Shef S. & I. pf, Ala.	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard Oil, U.S.	100	684½	....	680	675	675	652	653	648¾	656	646	650	646	411
Tenn. C. I. & R. R., Ala.	100	62⅜	61¼	62¾	61¼	61⅜	60⅜	61	60	61	58¾	....	....	....
U. S. Red & Ref., U. S.	100	....	....	32	....	....	....	....	....	....	....	....	....	100
U. S. Red & R. pf., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
U.S. Steel Corp., U.S.	100	34¾	33⅜	34¼	33⅞	34	33⅜	34	33⅜	33⅞	33¼	33⅜	33	48,742
U.S. Steel Corp. pf, U.S.	100	83⅝	82⅞	83⅜	83¼	83⅝	83⅛	83⅞	83⅛	84	82¾	83⅜	82½	47,157
Va.-Car Chem., U.S.	100	62⅜	....	....	....	63½	62⅞	63¾	62½	63	62	63¼	62	3,021
Va.-Car Chem. pf, U.S.	100	....	....	....	....	....	....	....	....	122	122	....	....	100
Va. I. C. & Coke, U. S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....

* New York Stock Exchange. † Pittsburg Stock Exchange. ‡Ex-Dividend. Total sales, 147,535 shares.

COLORADO SPRINGS, COLO.*

Name of Company.	Par val	May 11. H.	May 11. L.	May 12. H.	May 12. L.	May 13. H.	May 13. L.	May 14 H.	May 14 L.	May 15. H.	May 15. L.	May 16. H.	May 16. L.	Sales
Acacia	$1	.08⅜	.08⅝	.08⅞	.08¾	.08¾	.08⅝	....	....	....	....	....	....	5,000
Am. Con.	1	.03	.02⅜	.03⅜	.03	.03	....	....	....	....	....	....	....	6,000
Anaconda	1	.18	.14¾	.14¾	....	.14¾	....	....	....	....	....	....	....	....
Ben Hur	1	.02	....	.02½	.02	.02	....	....	....	....	....	....	....	....
Blue Bell	1	.05	....	.05⅜	....	.08	.05½	....	....	....	....	....	....	....
C. C. & M.	1	.02¼	.02	.02¾	.02	.02½	.02	....	....	....	....	.02¼	.02	3,000
C. K. & N.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
C. C. Con.	1	.05	.04¾	.05	.04¾	.05	.04½	....	....	....	....	.05	.04½	2,000
Coriolanus	1	.02¾	....	.03	....	.02⅝	....	....	....	....	....	....	....	....
Des Moines	1	.02⅞	....	.03¼	.02⅞	.03⅜	.02½	....	....	....	....	.02½	.02¼	6,000
Dr. Jack Pot	1	.10	.08	.10	.08	.09	.08¾	....	....	....	....	....	....	....
Elkton Con.	1	.39	.37½	.39	.37½	.39	.38	....	....	....	....	....	....	2,000
El Paso	1	.59½	.59¼	.60	.59½	.60	.59¼	....	....	....	....	....	....	....
Fannie Rawlings	1	.05	.03¾	.05	.03¾	.05	.03½	....	....	....	....	....	....	....
Findley	1	.15½	.13	.14¼	.13¾	.14¼	.13½	....	....	....	....	.14	.13¾	4,000
Gold King	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Dollar Con.	1	.05¾	.05⅜	.05¾	.05½	.05¾	.05½	....	....	....	....	.05¼	.05⅜	12,000
Golden Cycle	1	.78	.77½	.78	.76¾	.78	.76	....	....	....	....	.75½	.75	11,000
Golden Fleece	1	.11	.05	.10	.05	.10	.05	....	....	....	....	....	....	....
Gould	1	.03¼	.03¼	.03¾	.03¼	.03¼	.03	....	....	....	....	....	....	3,000
Hart	1	.02	....	.02	....	.02	....	....	....	....	....	....	....	....
Isabella	1	.18¼	.18¼	.18¾	.18¼	.17	.16¾	....	....	....	....	....	....	....
Jack Pot	1	.10	....	.10	....	.10	....	....	....	....	....	.08	.06¾	1,000
Last Dollar	1	.50	.30	.50	.30	.60	.20	....	....	....	....	....	....	....
Lexington	1	.04¼	.04¼	.05	.04	.04½	.04½	....	....	....	....	....	....	....
Little Puck	1	.03¾	.03	.03¼	.02½	.03½	.02¾	....	....	....	....	.03¾	.03¼	1,000
Mollie Gibson	1	.07¼	.05	.07	.05¼	.07	.05¼	....	....	....	....	....	....	....
Moon Anchor	1	.08¼	.07¼	.08¼	.07¼	.09	.07¼	....	....	....	....	....	....	....
New Haven	1	.02¾	.02¾	.03	.02¼	.02¾	.02¾	....	....	....	....	....	....	....
Pharmacist	1	.04¼	.03¼	.04	....	.04¾	.04	....	....	....	....	....	....	....
Pinnacle	1	.04½	....	.04½	....	.04½	....	....	....	....	....	....	....	....
Pointer	1	.01¼	.01¼	.01½	.01	.01¼	.01	....	....	....	....	....	....	....
Portland	1	1.38	1.35	1.36	1.35	1.38	1.30	....	....	....	....	....	....	3,200
Prince Albert	1	.02¼	....	.02¾	....	.02¼	....	....	....	....	....	....	....	....
Vindicator	1	.95	.90	.95	.90	.90	....	....	....	....	....	.95	.80	1,000
Work	1	.07	.06¾	.07	.06¾	.07	.06¾	....	....	....	....	.07	.06¾	5,000

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 65,200 shares.

COLORADO SPRINGS. (*By Telegraph.*)

Name of Company.	May 18. H.	May 18. L.	May 19. H.	May 19. L.	Name of Company.	May 18. H.	May 18. L.	May 19. H.	May 19. L.
Acacia	.09	.08¾	.09	.08¾	Golden Cycle	.78	.75	.76	.75
Am. Con.	....	....	....	....	Golden Fleece	.11	.05	.11	.05
Anaconda	.20	.14¾	.18	.14¾	Isabella	.17	.16¾	.17	.16¾
Cripple Creek Con.	.05	.04¾	.05	.04¾	Jack Pot	.09	.08	.09	.08
C. K. & N.	.20¾	.20¼	.20¼	.19¾	Last Dollar	.60	.30	.60	.25
Doctor Jack Pot	.10	.08	.09¼	.08	Mollie Gibson	.07	.05¼	.06¾	.06
Elkton Con.	.39	.38¾	.41	.40	Moon Anchor	.08¼	.07¾	.08¾	.07¾
El Paso	.60¼	.59¾	.61	.60

STOCK QUOTATIONS.

MEXICO*. May 8.

Name of Company	Share Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Durango.				
Ca. Min. de Penoles	2,500	$50.00	$4,000	$4,500
San Andres de la Sierra	200	.....	1,000	.....
Guanajuato.				
Angustias, Pozos	2,400	5.00	80	85
Cinco Senores y An., aviadoras	2,000	15.00	210	215
Cinco Senores y An., aviada	400	10.00	175	185
Providencia, SanJuan de la Luz	6,000	2.00	138	140
Queensland y Australia	300	.....	65	80
Guerrero.				
Garduno y Anexas	7,200	.....	35	60
Hidalgo.				
Amistad y Concordia	9,000	6.90	72	73
Carmen, aviada	1,100	.....	135	150
Guadalupe Fresnillo mill	1,000	.....	250	300
Guadalupe Fresnillo Mine	1,400	.....	70	80
La Blanca, aviadora	1,536	.....	1,100	1,150
La Blanca, aviada	768	.....	850	880
La Reina y An., aviadora	5,000	.....	18	22
Maravillas y An., aviador	1,680	.....	100	.....
Maravillas el Lobo	1,000	.....	130	180
Palma y An., aviador	1,800	.....	.....	12
Real del Monte	2,554	10.00	650	700
Santa Ana y An., aviadora	1,800	.....	30	40
Santa Ana y An., aviada	600	.....	25	30
Sta. Gertrudis y An., aviadas	9,000	.....	.....	7
Sta. Gertrudis y An., aviadora	28,800	1.00	80½	81
Santo Tomas Apostol aviadoras	5,100	.....	1	3
San Felipe de Jesus, aviadora	3,600	.....	25	27
San Felipe de Jesus, aviada	1,200	.....	.....	10
San Rafael y An., Trompillo	1,200	12.00	1,110	1,120
San Rafael y An., aviada	1,200	$4.00	$365	$380
Soledad, aviada	960	10.00	380	380
Sorpresa, aviada	960	5.00	310	315
Mexico.				
Alacran	2,400	.....	35	45
Buen Despacho	3,000	.....	60	65
Dos Estrellas	3,000	30.00	2,120	2,140
La Esperanza (El Oro)	3,000	10.00	1,170	1,190
La Reforma, aviadores	2,000	.....	55	60
Santa Ana, Esperanza	2,400	.....	70	90
Michoacan.				
Luz de Borda, aviadora	3,000	.....	72	75
Luz de Borda, aviada	1,000	.....	10	14
San Luis Potosi.				
Concepcion y An	3,000	.....	95	105
El Barreno, aviadora	2,000	2.00	35	37
Sta. Maria de la Paz	2,400	20.00	710	720
San Diego y Annexas	2,400	4.00	18	20
Zacatecas.				
Asturiana y An	2,500	.....	60	65
Candelaria y Pinos	2,500	10.00	300	315
Esperanza y An	2,400	.....	50	60
Lourdes	2,500	.....	25	35
Luz de Minillas, pagadoras	2,000	.....	20	30
San Carlos y Annexas	2,500	20.00	145	155
Sta. Maria de Gaud.	2,500	10.00	55	65
Miscellaneous.				
Bartolome de Medina	2,000	1.50	72	75
Guadalupe Hacienda	10,000	6.00	.....	.....
La Luz Hac. (Pachuca)	3,750	.....	285	295
La Reina (Chihuahua)	192	.....	.....	.....
Naica (Chihuahua)	100	.....	10,000	13,000
Natividad (Oaxaca) aviadora	1,800	10.00	700	900
Natividad (Oaxaca) aviadas	800	4.00	700	900
San Francisco Hac	6,000	1.00	40	45
Santa Ana Huantla Morelos	4,000	.....	.....	.....
Union Hacienda	3,000	5.00	220	240

* Values are in Mexican currency.

SAN FRANCISCO (*By Telegraph*).

Name of Company.	May 18.	May 19.	Name of Company.	May 18.	May 19.
Belcher	.35	.30	Justice	.04	.03
Best & Belcher	1.50	1.50	Mexican	.70	.65
Caledonia	1.40	1.20	Occidental Con	.29	.25
Challenge Con	.35	.32	Ophir	1.45	1.35
Chollar	.25	.21	Overman	.39	.33
Confidence	1.10	1.05	Potosi	.23	.23
Con. Cal. & Va	1.15	1.00	Savage	.17	.15
Con. Imperial	.03	.03	Sierra Nevada	.61	.56
Crown Point	.19	.16	Union Con	.04	.55
Gould & Curry	.38	.36	Utah Con	.48	.41
Hale & Norcross	.55	.52	Yellow Jacket	.36	.33

SALT LAKE CITY.* May 16.

Name of Company	Shares.	Par Val	High	Low	Sales.
Ajax	300,000	$10	.25	.22	2,500
Ben Butler	500,000	1	.15	12½	14,300
California	300,000	1	13½	13¼	500
Con. Mercur	1,000,000	5	1 32½	1.21	12,600
Creole	.....	.....	.62	.60	675
Comstock	.....	.....	1.70	1.67½	800
Daly	.....	.....	1.85	1.85	100
Daly-Judge	300,000	1	10.45	9.20	1,270
Daly-West	300,000	20	47.75	47.00	874
Grand Central	250,000	1	5.00	4.87½	700
L Mammoth	150,000	1	1.51	1.15	89,300
M. Washington	300,000	.....	.03¼	.03	16,500
Mammoth	400,000	25	1.21	1.10	400
Majestic Cop	.....	.....	.....	3.75	3.60	300
May Day	400,000	0.25	.24¾	.19½	47,500
N. Y. Bonanza	.....	.....	.28¼	.24½	17,300
Naildriver	.....	.....	.....	1.72½	1.72½	200
Sacramento	1,000,000	5	.26⅛	.25⅝	5,100
Silver Shield	.....	.....	.....	.09	.07	10,600
Star Con	600,000	1	.33	.24	66,100
S. Swansea	150,000	1	.21	.20	3,700
Uncle Sam	500,000	1	.38	.26¼	8,800
Utah	100,000	10	.77	.76⅝	1,800
Victor	500,000	1	.24⅜	.21	9,100
Wabash	.....	.....	.26⅜	.26¼	1,000
Yankee Con	500,000	1	.49	.36	13,800

All mines are in Utah. *By our Special Correspondent. Total sales, 325,219 shares.

ST. LOUIS, MO.* May 16.

Name.	Capital Stock.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo	$3,000,000	$10	$0.60	$0.80
Catherine Lead, Mo.	500,000	10	1.80	3.00
Central Coal & C	1,875,000	100	64.50	65.25
Central C. & C., pf.	1,875,000	100	75.00	77.00
Central Lead, Mo	1,000,000	10	130.00	140.00
Columbia Lead, Mo.	$500,000	10	$12.00	15.00
Con. Coal, Ill	500,000	100	21.75	23.00
Doe Run Lead Co	1,500,000	100	105.00	111.00
Granite Bimet., Mt.	1,000,000	10	0.75	0.85
St. Joe Lead, Mo	6,000,000	10	16.00	17.00

* From our Special Correspondent.

PHILADELPHIA, PA.*

Name and Location of Company.	par val	May 13. H.	May 13. L.	May 14. H.	May 14. L.	May 15. H.	May 15. L.	May 16. H.	May 16. L.	May 18. H.	May 18. L.	May 19. H.	May 19. L.	Sales
Am. Alkali, Mich	$50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Cement	10	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Cambria Iron, Pa	50	.....	.....	47½	.....	.....	.....	.....	.....	47½	47½	.....	.....	69
Cambria Steel, Pa	50	24	.....	24⅜	24	24	.....	23⅜	23¼	24⅜	23⅛	23⅞	.....	2,048
Penn. Steel, pfd	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Susq. I. & S., Pa	5	2⅛	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
United Gas I., Pa	50	93⅜	92	92⅛	91¾	91⅜	91	91¼	90⅝	90⅛	90	90¼	89	14,799
Warwick I. & Steel	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 28,836 shares.

LONDON. May 8.

Name and Country of Company	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt.	Latest dividend. Date	Quotations. Buyers. £ s. d.	Quotations. Sellers. £ s. d.
Alaska-Treadwell, g., Alaska	200,000	5 0 0	3 0	Apr., 1903	4 12 6	4 17 6
Anaconda, c. s., Montana	1,200,000	5 0 6	2 0	May, 1903	5 7 6	5 10 0
Arizona, c., Def., ord	63,444	1 0 0	5 6	Feb., 1903	7 15 0	8 5 0
Arizona, pref., ord	316,350	1 0 0	5 6	Feb., 1903	8 0 0	8 5 0
Camp Bird, g., Colorado	738,000	1 0 0	0 7½	May, 1903	1 18 6	1 17 6
Central Chile, c., Chile	276,248	1 0 0	.....	.....	3 0	4 0
Copiapo, c., Chile	112,500	2 0 0	6 10	May, 1903	2 2 6	2 7 6
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	10 0	12 6
El Oro, g., Mexico	1,000,000	1 0 0	1 6	Dec., 1902	1 13 9	1 16 3
Frontino & Bolivia, g., Colombia	128,662	1 0 0	3 0	July, 1901	17 6	1 0 0
Le Roi, g., British Col	200,000	5 0 0	5 0	Nov., 1899	1 8 9	1 11 3
Le Roi No. 2, g., British Col	120,000	5 0 0	5 0	May, 1902	1 6 3	1 8 9
Mesquital, Mexico	250,000	2 0	3	Feb., 1903	3 6	4 6
Montana, g. s., Montana	657,128	1 0 0	6	April, 1899	1 9	2 3
Mountain, c., Cal	250,000	5 0 0	4 0	Nov., 1902	3 2 6	3 7 6
Stratton's Independence, Colorado	1,000,007	1 0 0	6	April, 1902	9 6	10 6
St. John del Rey., g., Brazil	546,265	1 0 0	6	Dec., 1902	15 6	16 6
Utah Con., g. c., (Highland Boy), Utah	300,000	1 0 0	7 0	Jan., 1903	5 15 0	6 0 0
Ymir, g., British Col	200,000	1 0 0	1 0	Mar., 1902	13 9	16 3
European:						
Linares, l., Spain	15,000	3 0 0	9	Oct., 1902	3 0 0	3 10 0
Mason & Barry, c., sul., Port'g'l	185,172	1 0 0	11 0	May, 1903	3 17 6	4 2 6
Rio Tinto, c., Spain	325,000	5 0 0	27 6	Apr., 1903	49 7 6	49 12 6
Rio Tinto, pref., Spain	325,000	5 0 0	2 6	Apr., 1903	6 0 0	6 5 0
Tharsis, c., Spain	625,000	2 0 0	6 0	May, 1903	4 10 0	4 15 0
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	495,388	1 0 0	1 6	Jan., 1900	1 17 6	2 0 0
Briscis, Tin, Tasmania	600,000	1 0 0	.....	.....	4 6	5 6
Broken Hill Pr'p., s., N. S. Wales	960,000	8 0	1 0	Feb., 1903	1 13 6	1 14 6
Cosmopolitan Prop., W. Australia	385,000	1 0 0	6	July, 1902	17 6	18 6
Golden Horse Shoe, W. Australia	300,000	5 0 0	6 0	Apr., 1903	10 12 6	10 15 0
Great Fingall Con., W. Australia	250,000	1 0 0	5 0	Sept., 1902	7 16 3	7 18 9
Great Bo'd'r Pr'p., W. Australia	1,750,000	2 0	6	Mar., 1903	1 1 9	1 2 3
Ivanhoe Gold Corp. W. Australia	200,000	5 0 0	4 0	Jan., 1903	9 6 3	8 8 8
Kalgurli, g., W. Australia	120,000	1 0 0	2 6	Apr., 1903	4 6 3	4 8 9
Lake View Cons., g., W. Australia	250,000	1 0 0	rts.	Aug., 1902	2 10 0	2 11 3
Mt. Lyell M. & R. I., c., Tasmania	275,000	3 0 0	1 0	Apr., 1903	2 15 0	3 0 0
Mt. Morgan, g., Queensland	1,000,000	1 0 0	3	May, 1903	3 5 0	4 0 0
Waihi, g., New Zealand	497,412	1 0 0	2 6	Mar., 1903	5 7 6	5 10 0
Indian:						
Champion Reef, g., Colar Fields	473,000	10 0	4 6	May., 1903	7 13 9	7 18 3
Mysore Gold, Colar Fields	530,000	10 0	5 0	Mar., 1903	7 11 3	7 13 9
Nundydroog, g., Colar Fields	484,000	10 0	1 6	Mar., 1903	2 7 6	2 10 0
Ooregum, g., Colar Fields	343,000	10 0	1 6	Apr., 1903	1 13 9	1 16 3
Ooregum, pref., g., Colar Fields	240,000	10 0	1 6	Apr., 1903	2 5 0	2 7 6
African:						
Angelo, g, Transvaal	600,000	1 0 0	6 0	Feb., 1903	7 0 0	7 5 0
Bonanza, g., Transvaal	200,000	1 0 0	12 0	Feb., 1903	4 2 6	4 5 0
British South Africa	4,436,019	1 0 0	rts.	May, 1899	3 0 7	3 1 9
Cape Copper, S. Africa	300,000	2 0 0	8 0	Jan., 1902	2 15 0	2 17 6
Cape Copper, pref., S. Africa	75,000	2 0 0	2 3	Jan., 1903	3 2 6	3 7 6
City and Sub'n (New), g., Transvaal	340,000	4 0 0	8 0	Aug., 1899	6 10 0	6 12 6
Crown Reef, g., Transvaal	120,000	1 0 0	11 0	May. 1903	17 15 0	18 5 0
De Beers Con., d., pref., Cape Colony	800,000	2 10 0	10 0	Mar., 1903	10 11 3	10 12 9
De Beers Con., def	1,000,000	2 10 0	12 6	Mar., 1903	21 15 0	21 17 6
East Rand, Prop, Transvaal	970,000	1 0 0	rts.	May., 1902	7 17 6	8 0 0
Ferreira g., Transvaal	90,000	1 0 0	2 0	May, 1903	21 15 0	22 5 0
Geldenhuis Est., g., Transvaal	200,000	1 0 0	5 0	Feb., 1903	6 10 0	6 12 0
Geduld, g , Transvaal	400,000	1 0 0	rts.	Mar., 1902	7 8 9	7 11 3
Henry Nourse, g., Transvaal	125,000	1 0 0	8 0	Feb., 1903	9 5 0	9 10 0
Jagersfontein, d., Orange F. S	200,000	5 0 0	6 0	Nov., 1899	29 0 0	29 5 0
Jubilee, g., Transvaal	50,000	1 0 0	5 0	June, 1903	5 0 0	5 5 0
Jumpers, Transvaal	100,000	1 0 0	5 0	Aug., 1899	3 15 0	4 0 0
Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Sept., 1899	4 0 0	4 2 6
May Con., g., Transvaal	288,750	1 0 0	3 0	Feb., 1903	4 6 3	4 8 9
Meyer & Charlton, g., Transvaal	100,000	1 0 0	3 0	Feb., 1903	5 12 6	5 15 0
Modderfontein, g., Transvaal	90,000	1 0 0	.....	.....	4 2 6	4 7 6
Namaqua, c., Cape Colony	94,331	2 0 0	2 0	June, 1902	3 2 6	3 7 6
Primrose (New), g., Transvaal	325,000	1 0 0	2 0	Feb., 1903	3 16 3	3 18 9
Rand Mines, g., S. Africa	1,795,956	5 0	4 0	Aug., 1902	10 16 3	10 17 6
Robinson, g., Transvaal	750,000	5 0 0	6 0	Feb., 1903	10 5 0	10 10 0
Robinson Deep, g., Transvaal	950,000	1 0 0	5 0	May., 1899	4 18 9	5 1 3
Rose Deep, Transvaal	425,000	1 0 0	2 0	Feb. 1903	8 17 6	9 2 6
Salisbury, g., Transvaal	100,000	1 0 0	2 0	Mar., 1899	2 12 6	2 17 6
Sheba, g., Transvaal	1,075,000	1 0 0	6	July, 1898	1 1 3	1 3 9
Village Main Reef, Transvaal	400,000	1 0 0	5 0	Oct., 1902	8 12 6	8 15 0
Wemmer, Transvaal	80,000	1 0 0	10 0	Jan., 1903	12 10 0	13 0 0

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

LONDON. (*By Cable*).*

Name of Company.	May 12. £. s. d.	May 13. £. s. d.	Name of Company	May 12. £. s. d.	May 13. £. s. d.
Anaconda	5 10 0	5 5 0	Johannesburg Invest	3 7 6	3 2 6
British South Africa	3 0 0	2 18 9	Modderfontein	10 6 3	10 2 6
Camp Bird	1 16 3	1 15 10½	Rand Mines	10 13 9	10 5 0
Con. Gold-Fields	7 7 6	7 1 3	Rio Tinto com	50 15 0	50 0 0
De Beers Con. def	22 0 0	21 15 0	Simmer & Jack	1 10 7½	1 10 7½
East Rand	8 14 0½	7 6 10	Tomboy	1 17 6	1 13 9
El Oro, Mex	1 13 9	1 13 9			
Jagersfontein	29 2 6	29 10 0			

* Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. May 5.

Name of Company.	Country.	Product.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Boleo	Lower Cal	Copper	.....	500	176.00	1,430.00	1,416.00
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	22.25	22.25
Fraser River	Brit. Col'mb.	Gold	250,000	25	.....	6.50	6.50
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	100.00	100.50
Metaux, Cie. Fran. de	France	Metal dealers.	25,000,000	500	22.50	469.00	472.00
Nickel	N. Caled'nia	Nickel	15,000,000	250	22.50	476.00	481.00
Sedalia & California	Calif. U. S.	Oil	1,000,000	1	9.50	9.50	9.50
Rebecca	Colo'do, U. S.	Gold	5,000,000	25	.....	0.50	0.75
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	659.00	672.00

TORONTO, ONT.* May 16.

Name of Company.	par val	Prices. High.	Prices. Low.	Sales.	Name of Company	Par val	Prices. High.	Prices. Low.	Sales.
Black Tail	$1	.07	.02½	.....	Granby Smelter	$10	505	.....	.....
Cariboo (Mc. K.)	1	.14	.11	.....	Mountain Lion	1	.20	.12	.....
Cariboo (Hyd.)	1	.75	.....	.....	North Star	1	14	.11	2,500
Center Star	1	.31	.28¼	22,000	Nova Scotia Steel, com	100	1 01¼	.98½	.....
Crows Nest, C	100	4.00	3.00	.....	Payne	1	.19	.14	.....
Dominion Coal, com	100	1.10¼	1.08	.....	Rambler Cariboo	1	.41	.37	.....
Dominion S. & I	100	.30	.22¼	.....	Republic	1	.06	.03	.....
Dominion S. & I., pref	100	.....	.....	.....	St. Eugene	1	.45	.35	.....
Fairview	1	.03¼	.05¼	5,000	Virtue	1	.08	.05½	.....
Giant	1	.04	.02	.....	War Eagle Con	1	.16	.11½	.....

*Standard Stock and Mining Exchange. Total sales 29,500 shares